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JPRS Report

Nuclear Developments

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JPRS-TND-90-013

CONTENTS

8 AUGUST 1990

SUBSAHARAN AFRICA

SOUTH AFRICA

New Atomic Testing Laboratory Opened [ENGINEERING NEWS 22 Jun]	1
Koeberg Reactor Vessel To Be Inspected [ENGINEERING NEWS 6 Jul]	1

CHINA

Public Health Safeguards During Nuclear Tests Described [XINJIANG RIBAO 26 Apr, 3 May] ...	2
State Delays Use of Qinshan Nuclear Plant [Hong Kong HONGKONG STANDARD 24 Jun]	3
Research Center Findings Called 'Fruitful' [XINHUA]	4
UK Atomic Group Assesses Guangdong's Daya Bay [XINHUA]	4

EAST ASIA

JAPAN

Nuclear Ship Mutsu Begins Sea Trials [KYODO]	5
--	---

NORTH KOREA

Foreign Ministry Rejects U.S. Nuclear Demands [KCNA]	5
Spokesman Attacks Bush Remarks on Nuclear Issue [Pyongyang Radio]	6

EAST EUROPE

CZECHOSLOVAKIA

IAEA Checks Temelin Nuclear Power Plant [Vienna DIE PRESSE 10 Jul]	7
Nuclear Plant Affects Relations With Austria	7
Vranitzky Asks Calfa for Statement [Vienna Radio]	7
Vranitzky Interview [Vienna TV]	7
Minister Calls for Plant Closure [ORF Teletext]	8
Aid Offered [ORF Teletext]	8
Vranitzky Wants Inspection of Plant [Vienna Radio]	8
Memorandum to Austria [CTK]	8
Austrian Minister Arrives [CTK]	9
Flemming on Nuclear Plant Danger [Prague TV]	9
Further on Nuclear Plant Talks [Prague TV]	9
Tirpak Statement [CTK]	10
Situation Assessed [NARODNA OBRODA 20 Jul]	10
Vranitzky on Talks With Havel [Prague Radio]	11
Havel Invites Austrians To Check Plant [WIENER ZEITUNG 27 Jul]	11
Discussions Inconclusive [HOSPODARSKE NOVINY 26 Jul]	11
Nuclear Plant Safety Reevaluated [CTK]	12
New Incidents at Bohunice Plant Reported [Hamburg DER SPIEGEL 23 Jul]	12
Officials Discuss Problems of Bohunice Nuclear Plant	13
Nuclear Safety Chairman Interviewed [SVOBODNE SLOVO 21 Jul]	13
Bohunice Director on Plant's Safety [NARODNA OBRODA 21 Jul]	14
General Director Outlines Uranium Industry Plans [HOSPODARSKE NOVINY 19 Jul]	14
Secret Report on Nuclear Commission Detailed	14
Frequent Incidents [Vienna Radio]	14
Safety Assessed [Vienna Radio]	15
Temelin Nuclear Power Plant Completion Not Decided [Vienna DER STANDARD 15 Jun]	16

POLAND

Dangers Posed by GDR Nuclear Plants; Spent Fuel Transit Examined [POLITYKA 26 May] 16

YUGOSLAVIA

Slovenia Wants To Shut Down Krsko Nuclear Plant [Vienna WIENER ZEITUNG 11 Jul] 19

LATIN AMERICA

ARGENTINA

Atucha Plant Operating at 'Full Capacity' [TELAM] 20

Deputy Reports Presence of Nuclear Dump [TELAM] 20

BRAZIL

CNEN Proposes Plan To Finish Angra II, III [O GLOBO 25 Jun] 20

Fonseca Justifies Secrecy Surrounding Program [O ESTADO DE SAO PAULO 22 Jun] 22

Santo Amaro Monazite Plant Remains Closed [O ESTADO DE SAO PAULO 16 Jun] 22

Military Projects Proposed for Nuclear Program [FOLHA DE SAO PAULO 4 Jul] 23

Country Positioned To Obtain Bomb Elements [FOLHA DE SAO PAULO 7 Jul] 23

Nuclear Program To Pass to Civilian Control [O GLOBO 9 Jul] 23

FRG Seeks To Change Focus of Nuclear Pact [O GLOBO 13 Jul] 24

Talks With Argentina on Modifying Tlatelolco [O GLOBO 7 Jul] 24

Committee Assesses Future Angra Costs [O ESTADO DE SAO PAULO 11 Jul] 25

CNEN Abandons Itataia Uranium Deposit [O ESTADO DE SAO PAULO 7 Jul] 25

Study Warns of Near Capability To Make Bomb [JORNAL DA TARDE 3 Jul] 26

Control of Aramar Nuclear Activities Urged [JORNAL DA TARDE 2 Jul] 26

Committee Proposes Uranium Reprocessing Plant [O ESTADO DE SAO PAULO 6 Jul] 29

NEAR EAST & SOUTH ASIA

INDIA

Plans for Second Nuclear Submarine Denied [THE TELEGRAPH 23 May] 30

Reportage, Comment on Alleged Pakistan Nuclear Bomb 30

Defense Analyst Subrahmanyam [THE TIMES OF INDIA 31 May] 30

Menon News Conference [THE TELEGRAPH 3 Jun] 31

Cecil Victor Analysis [PATRIOT 29 May] 31

External Affairs Minister [PATRIOT 24 May] 32

Indian Bomb Advocated [THE STATESMAN 21 May] 32

IRAN

Huge Uranium Reserves Confirmed in Saghand Mine [Tehran TV] 33

IRAQ

Saddam Questioned About Nuclear Weapons [INA] 33

ISRAEL

Air Force Commander Discusses Offensive Weapons [THE JERUSALEM POST 17 Jul] 34

Powell, Arens Discuss Arrow Project, Cooperation [Jerusalem Radio] 34

PAKISTAN

Tritium Transfer to Nuclear Weapons Program Detailed

[Paris POLITIS—LE CITOYEN 22-28 Feb] 35

Bhutto Denies Nuclear Weapons Program [Kuwait KUNA] 39

SOVIET UNION

Nuclear Power Minister Interviewed on U.S. Accord [EKONOMIKA I ZHIZN Jul] 40

WEST EUROPE

CANADA

Ontario Hydro To Study Possible New Nuclear Station [THE GLOBE AND MAIL 14 Jun]	43
Darlington Workers Exposed to Radioactive Spill [THE TORONTO STAR 27 Jun]	43
Epp Orders Inspection of Romanian Candu Complex [THE GLOBE AND MAIL 7 Jun]	43
Pickering Nuclear Reactor Restarted After Shutdown [THE GLOBE AND MAIL 7 Jun]	43

FRANCE

Generator Replacement Program Nears Completion [L'USINE NOUVELLE/TECHNOLOGIES May]	44
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SOUTH AFRICA

New Atomic Testing Laboratory Opened

90AF0422X Johannesburg *ENGINEERING NEWS*
in English 22 Jun 90 p 15

[Text] Companies wishing to have polymers evaluated, identified or tested will in future be able to make use of the most comprehensive laboratory testing facilities in South Africa.

This follows the opening of the Atomic Energy Corporation's Materials Chemistry Laboratory to private industry in South Africa.

According to Dr Norman Schnautz, the laboratory has the facilities to conduct a broad range of tests, including ASTM, tensile, impact and harness testing.

"Among the methods which we employ are thermal analysis, differential scanning calorimetry, thermogravimetric analysis, pyrolysis GCMS, and DSC.

Dr Schnautz says the laboratory has already conducted a number of investigations on behalf of private undertakings.

"These include the identification of constituents of various samples, checking on whether supplied materials accord with specifications, and determining the thermal stability of polyethylenes.

"Industrialists can make use of this facility to determine whether a material is suited to a particular application.

"Our service does not, however, stop at analysis.

"In addition to identifying and evaluating the performance of polymers, we have the expertise to recommend possible alternative materials for particular applications.

"We are also able to play a quality control role in relation to resins used for manufacturing various products," he says.

Koeberg Reactor Vessel To Be Inspected

90AF0422Z Johannesburg *ENGINEERING NEWS*
in English 6 Jul 90 p 10

[Text] The first mechanised in-service inspection of the reactor vessel on unit one of Eskom's Koeberg nuclear power station is scheduled to be performed in September 1990.

The work will be carried out by MAN-Energie of Germany, which is represented in South Africa by Industrial Machinery Supplies (IMS).

Compliance with stringent safety standards for the construction and operation of nuclear power stations is of the utmost importance.

A priority factor is the integrity of the materials of the primary circuit, especially of the reactor pressure vessel in which the nuclear reaction takes place.

In order to meet these safety criteria, regular inspections of the condition of the parent material and welds of the reactor pressure vessel by non-destructive methods are called for.

Ultrasonic inspection is preferred for this because of its high reliability factor.

In-service inspection ensures that every change in the state of the materials can be recognised in good time, thereby eliminating the possibility of any sudden failure of a component.

Major constraints underlying the inspection of nuclear components are: liability to radiation exposure; limited access to inspection areas; the requirements for great accuracy of measurements; and good reproduction of the results.

This necessitates the use of remote-controlled mechanised inspection equipment, so-called manipulators, to scan the relevant areas of the nuclear components by means of ultrasonic probe modules.

A central mast manipulator constitutes the main means of inspection of reactor pressure vessels of pressurised water reactors of the type installed at Koeberg.

In 1982 MAN-Energie supplied a central mast manipulator together with other inspection equipment to Eskom and used this to perform and pre-service inspections of the reactor pressure vessels on both Koeberg units one and two prior to nuclear commissioning.

These ultrasonic pre-service inspections produced a precise record of the state of the material of the pressure vessels and thus established a reference basis for subsequent in-service inspections.

The in-service inspection to be carried out in September will include not only the actual inspection work on site, but also its planning and preparation, in addition to the on-line and off-line evaluation of the test results.

Approximately one billion sets of data will be collected during the inspection work—a volume which can only be handled with the aid of modern electronic evaluation equipment.

Reliable test results are vital and are achieved by the combination of high-grade technology and highly qualified personnel.

MAN-Energie and IMS are highly competent to provide this technology and have a proven track record in this field.

Public Health Safeguards During Nuclear Tests Described

90CM0230A Urumqi XINJIANG RIBAO in Chinese
26 Apr, 3 May 90

[Article by Ai Min (5337 3046): "The Orders From Zhongnanhai Are That Vigilance Is To Be Maintained; Report on the Threat of PRC Nuclear Testing to the Environment and Public Health"]

[26 Apr p 2]

[Text] Ever since the cloud from the explosion of the PRC's first atomic bomb mushroomed over an ancient expanse of wasteland in the western part of China on 16 October 1964, the PRC has had nuclear weapons with which to uphold its state sovereignty and safeguard world peace.

As the first foreign country to detect the atmospheric radioactive fallout from this explosion, Japan reached the conclusion from the tiny amount of fallout monitored that this was a nuclear test of very small explosive force.

Although the Japanese scientists' estimate was probably accurate, a point that they underestimated was the enormous efforts made by the CPC and the government of the PRC to keep the possible contamination from this nuclear test to a minimum, in order to protect the environment and public health in the vicinity of the test site.

All those with even a little knowledge of nuclear protection know that there are only four destructive, fatal, or harmful effects from atmospheric nuclear explosions, i.e., ray radiation, shock waves, early-stage nuclear radiation, and radioactive fallout. Generally speaking, the first three affect only the area within a radius of a few to some dozens of kilometers at the instant of the explosion, while the last one is local fallout of larger particles for only a few hours within a range of some dozens of kilometers upwind and a little over 100 kilometers downwind. Obviously, there is basic safety beyond some dozens of kilometers upwind and a little over 100 kilometers downwind from the center of a nuclear explosion.

At the beginning of the PRC's atomic bomb development, party and national leaders clearly stipulated that atmospheric nuclear tests would be conducted only in places that "were uninhabited, away from sources of water, without vegetation, and with few mineral resources, wide-open spaces, and far from residential areas." The nuclear test sites that were later chosen were vast open deserts, remote and uninhabited, away from sources of water, and wide-open spaces without vegetation, with circumferences of more than 200,000 square kilometers. The centers of explosions at nuclear test sites were over 150 kilometers upwind and 400 kilometers downwind from the nearest inhabited areas. One nuclear power [as published] has a number of residential areas

within 100 kilometers of a nuclear test site, and a famous city of over 60,000 people only 105 kilometers away, while another has a test site only 50 kilometers west of its third-largest river and 80 kilometers east of a city with tens of thousands of people. In comparison, the PRC's nuclear test sites are over three times farther away from the nearest inhabited areas than those of the same class in these two nuclear powers, and are the farthest from inhabited areas of any nuclear test sites in the world.

To protect the natural environment and public health, the CPC and the government of the PRC formulated a "necessary and limited" nuclear testing policy of few tests with low explosive force, premised on ensuring the fulfillment of our nuclear testing objectives. Up to 1980, while the number of atmospheric nuclear tests conducted by the two major nuclear powers had accounted for 45.6 percent and 33.6 percent, respectively, of all such tests throughout the world, the PRC's had accounted for only 5.2 percent and, while the atmospheric nuclear explosive force of the two major nuclear powers had accounted for 25.4 percent and 65.5 percent, respectively, of all such explosions throughout the world, the PRC's had accounted for only 3.8 percent.

The CPC Central Committee and the State Council have paid close attention to the issue of environmental protection in the vicinity of nuclear test sites and in affected areas, and former Premier Zhou Enlai issued special orders that protection against radioactive pollution from nuclear testing must be "absolutely sure and reliable." As atmospheric nuclear testing is apt to cause pollution due to meteorological fluctuations, test controllers have followed Premier Zhou's orders by conducting them only under the most favorable meteorological conditions of clear skies and gentle breezes in the vicinity of test sites and in affected areas, in order to absolutely prevent any radioactive pollution caused by spreading or settling of "fallout ash," due to sudden changes in wind speed or direction or by being carried in clouds, rain, snow, or hail. The concerned departments have not only taken many prevention steps, but have also made good emergency plans. Hou Jiali [0186 0116 4409], a research fellow from the Military Medicine Research Institute in the Xinjiang Military District who helped monitor the PRC's first atomic bomb explosion, remembers the many motor vehicles and first-aid personnel that were assembled at their monitoring site, which was situated in a residential district 400 kilometers downwind from the center of the explosion. They were deployed according to the instructions of the CPC Central Committee and the State Council in order to be ready at all times to move the residents to safe areas if local radioactive fallout spread downwind. Hou Jiali said that they reported directly to Beijing that they had detected no local fallout, in order to set the minds of the leading central authorities at rest. He said that the party, government, and concerned departments always keep the safety and health of all nationalities "in mind" during each nuclear test.

[3 May p 2]

[Text] A key factor in the solemn proclamation of the government of the PRC to halt atmospheric nuclear testing in March 1986 was that atmospheric testing polluted the environment and public health more than underground or underwater testing. In fact, nuclear testing in the PRC was shifted from atmospheric to underground testing in the early 1980's.

Most of the pollution to the environment in the vicinity of test sites and to public health throughout the world from atmospheric nuclear testing comes from smaller particles of radiation fallout produced during explosions.

As opposed to larger particles that settle near the center of explosions, these smaller particles circle the earth at the same altitude with upper air currents for long periods of time and they settle slowly. Most of the reports of atmospheric nuclear tests conducted by various countries are measurements of these "wind-carried particles." Naturally, atmospheric nuclear testing by any country in the world causes global radiation-fallout pollution for the whole world, and for those regions at the same altitude in particular. Thus, questions about whether the pollution from atmospheric nuclear testing is higher in the vicinity of PRC nuclear test sites and for residents in the Xinjiang region than in other regions must be answered by radiation-monitoring departments.

Thanks to the concern of the CPC Central Committee and the State Council, four radiation-monitoring centers were set up in Xinjiang, and about 10 monitoring sites were also set up in residential districts near nuclear test sites in the early stages of PRC nuclear testing. The specialists in radiation science who converged on Xinjiang from all over China have been vigilantly monitoring every slight fluctuation in radiation levels in all areas, for over 20 years without interruption.

At the Xinjiang Medical Radiation-Protection Supervision Clinic, which can be called the main force of these "guardian spirits" (radiation-monitoring sites) that can be found everywhere both north and south of the Tianshan Mountains, specialists bustle about everywhere in the vicinity of the nuclear test sites and at every monitoring center and site on both sides of the Tianshan Mountains. Having monitored the radiation content of atmospheric fallout, the air, the soil, the water, food, and human skeletons in these regions for over 20 years, they hold that the level of global radiation-fallout pollution in all areas of Xinjiang, including that in the vicinity of nuclear test sites, is far lower than normal internationally set domestic standards, and is even slightly lower in some aspects than those in other provinces and regions in China. The global radiation-fallout content from PRC nuclear testing is even less in the vicinity of test sites and in all areas of Xinjiang. A doctor who is a deputy director of the Supervision Clinic came up with the easily understandable analogy that "the radiation content from nuclear testing in Xinjiang is thousands of times less than that from a common chest X-ray."

Why is the global radiation-fallout pollution so small in Xinjiang? Hou Jiali, the research fellow from the Military Medicine Research Institute in the Xinjiang Military District (who is also deputy director of the PLA [People's Liberation Army] Defense Special Atomic Medicine Group), explained it as follows: Most of the man-made nuclides from nuclear explosions are short-lived, radiation fallout being no exception. Since it constantly diffuses, thins, and decays, and its radioactivity gradually decreases, as it circles the globe and settles, the slight amount of pollution that it causes does not pose a threat to the environment and public health.

Of course, this is only relatively speaking because, if all countries carried out unlimited atmospheric nuclear testing, the pollution would become increasingly heavier.

As all of Xinjiang's vast areas are situated upwind from nuclear test sites, the amount of radiation fallout that settles on both sides of the Tianshan Mountains after circling the globe for a week, is naturally infinitesimal.

State Delays Use of Qinshan Nuclear Plant

HK2407020890 Hong Kong HONGKONG STANDARD in English 24 Jul 90 p 10

[By Lo Dic]

[Text] Beijing is to delay the use of China's first nuclear plant, the Qinshan nuclear station, due to safety considerations.

Also for the same considerations, Beijing will postpone the date set for identifying sites for two new plants.

The date for the identification was originally set at next month, according to a Beijing official from the Energy Resources Ministry.

The 300,000-kilowatt water reactor of the Qinshan station is the first Chinese designed nuclear powerplant. Previously, the Energy Resources Minister Huang Yicheng said it would be in operation by the end of this year.

But Ding Yupci, head of the ministry's principal engineer office in nuclear industry, said yesterday the target would not be met.

The concerned authorities have decided to delay indefinitely the operation for safety reasons, he said.

This is not because of any serious loopholes but to ensure the operation, he said, adding that the authorities had raised the quality standard in recent months.

Mr Ding said more studies and tests would be carried out to ensure its resistance to earthquakes.

"Just as all other sites so far chosen to be considered for building new nuclear plants, the Qinshan station is situated in China's coastal region which, unlike Japan, Taiwan or the Philippines, is not on an earthquake belt," he said.

"But to be sure, for forecasting earthquakes, the technique now available is still far from perfect. Earthquakes in the region should not be ruled out."

Mr Ding said for this reason the concerned authorities also had decided to postpone the date for identifying new sites to allow more research.

He said the Ministry of Energy Resources was considering building two new plants, each with capacity of 6,000 megawatt, soon.

And it is also considering building two more plants by 2010.

But the capacity of the plants would only contribute a small portion of the country's total electricity-generating capacity, about 5 to 10 per cent, he said.

The two plants to be built soon are planned to include two 1,000-megawatt reactors from the Soviet Union.

"The crux is to choose the suitable sites. It is only after this is done that the negotiations of introducing foreign nuclear reactors can come to a substantial stage," he said.

With regard to the prospective sites, he said all would be in the coastal region because most of the inland provinces possess abundant hydropower or coal resources.

He also said his office had been supervising the Daya Bay nuclear plant and was satisfied with the progress.

Research Center Findings Called 'Fruitful'

*OW2707131790 Beijing XINHUA in English
0759 GMT 27 Jul 90*

[Text] Shenyang, July 27 (XINHUA)—Scores of fruitful research findings have appeared in materials physics since the establishment of the International Center for Materials Physics in 1987 in this capital of Liaoning Province.

The center is expected to become one of the most important centers for materials physics in the Third World.

Integrating modern theoretical physics and materials science, the center is one of the many branches of the Chinese Academy of Sciences. It conducts academic exchanges with foreign scientists and introduces new concepts, data, and research methods in the field.

Among the research and experiment topics of the center are fractal and its applications in materials science, the theory of dislocation and disruption, and research into special materials. Theses on these topics, numbering over 80, have been published in academic journals in China and foreign countries.

The center was selected as one of the 40 outstanding academic research centers in the world by UNESCO and the International Center for Theoretical Physics (ICTP) under the International Atomic Energy Committee in

1988. Last year, it was chosen as a candidate to join the 20 affiliated centers of the ICTP.

UK Atomic Group Assesses Guangdong's Daya Bay

*OW0108081290 Beijing XINHUA in English
0702 GMT 1 Aug 90*

[Text] Hong Kong, August 1 (XINHUA)—The nuclear power station being built at Daya Bay in south China's Guangdong Province will pose much lower risks to Hong Kong people's health than other risks encountered by people here, according to a risk assessment report released here yesterday.

The report made by the British Atomic Energy Authority notes that health risks associated with accidents at the Daya Bay Nuclear Power Station are much lower, by a very wide margin, than other risks encountered by Hong Kong people in everyday life.

It says many nuclear power plants similar to that being built at Daya Bay are operating around the world and are considered by the relevant authorities to pose an acceptable small risk to their surrounding population.

The assessment includes an analysis of the plant system, aimed at evaluating accident probabilities and possible health risks in Hong Kong.

It says that the results of the plant analysis are generally consistent with detailed studies of similar reactor types performed by others.

"This, and the fact that no obvious plant-specific weaknesses are apparent from the present work, provides an assurance that the Daya Bay plant risks will be in line with those of many other pressurized water reactor plants of the same design," it says.

In summarizing some of the important features of the calculated risks, the report gives two examples of societal risk. These are:

- the probability, per year of station operation, of the occurrence of one or more early deaths is one chance in a million. Larger numbers of early deaths are less likely.
- the probability, per year of station operation, of the occurrence of one or more fatal cancers is one chance in 50,000. Larger numbers are again less likely.

Two examples of individual risk are given and these are:

- the average individual risk of early death, per year of station operation, is one in 500 million.
- the average individual risk of fatal cancer, per year of station operation, is less than one in 10 million.

Commenting on the report, Elizabeth Boshier, deputy secretary for economic services, said the consultants' findings should help allay public concern about the level of risk that may be posed to Hong Kong by the construction of the nuclear power station at Daya Bay.

JAPAN

Nuclear Ship Mutsu Begins Sea Trials

OW1307121690 Tokyo KYODO in English 0712 GMT
13 Jul 90

[Text] Mutsu, Aomori Pref., July 13 (KYODO)—The Mutsu, Japan's only nuclear-powered vessel, commenced sea trials Friday in the Pacific off the Sanriku coast, with the start-up of its reactor which supplies power to the ship's propellers. It is the first sea trial for the 8,242-ton Mutsu since its completion 20 years ago.

The reactor's output level will be raised to 50-70 percent of full capacity during a series of trial sailings, which will last until the end of the month.

During the voyages the impact of wave vibrations on the ship's reactor and other equipment will be examined, and the safeguards necessary for the operation of nuclear-powered vessels will be reviewed, officials of the Japan Atomic Energy Research Institute said.

After returning to port July 30, the ship will leave for further trials with its reactor operating at full capacity. Depending on the successful outcome of these trial sailings, the Mutsu will begin a yearlong experimental voyage to the South Pacific in the fall before being retired permanently, they said.

The experiments are being conducted by the institute, which is under the Science and Technology Agency.

The Mutsu arrived late Thursday at the sea trial site, located 210 kilometers from the coastal port in Aomori Prefecture, northern Japan, using auxiliary engine power. When the ship's reactor reached 24 percent of full operating capacity, it was stopped momentarily and the steam generated by the reactor was then sent through the turbine to drive the screws. Officials said the reactor is operating normally and no leaks of radioactivity have been reported.

On Saturday the ship's reactor output level will be increased to 50 percent and the vessel will cruise at a speed of 10 knots until Sunday, the officials said.

Starting next week, the reactor will undergo abrupt pressure experiments and other tests to check its safety systems. The aim is to raise the output level to 70 percent by the end of the month, the officials said.

The vessel, launched in 1969 and completed in 1972, is powered by a single light-water reactor with a capacity of 10,000 horsepower and has a maximum cruising speed of 16.5 knots.

NORTH KOREA

Foreign Ministry Rejects U.S. Nuclear Demands

SK1607052890 Pyongyang KCNA in English
0511 GMT 16 Jul 90

["Statement of Foreign Ministry Spokesman"—KCNA headline]

[Text] Pyongyang July 16 (KCNA)—The spokesman of the Ministry of Foreign Affairs of the Democratic People's Republic of Korea in a statement on July 15 said that if the United States removes a nuclear threat to us, we are fully ready to conclude a safeguard agreement under the Nuclear Non-Proliferation Treaty with the International Atomic Energy Authority (IAEA) any moment.

The spokesman of the Foreign Ministry categorically rejected the unilateral demand that we should sign a safeguard agreement under the Nuclear Non-Proliferation Treaty, which was made by U.S. President Bush, ignoring our just demand, in his "statement" a few days ago in the capacity of chairman of the "summit of seven Western industrialized nations".

Bush said that the DPRK causes "grave apprehensions" as it does not conclude a safeguard agreement under the Nuclear Non-Proliferation Treaty with the IAEA.

His "statement" totally reverses black and white.

The U.S. President in this "statement" didn't refer at all to the fact that the United States is posing a constant nuclear threat to the DPRK by deploying many nuclear weapons in the south of the Korean peninsula.

When joining the Nuclear Non-Proliferation Treaty, the DPRK Government duly respected that this would promote the conversion of the Korean peninsula into a nuclear-free zone according to the treaty obligations.

After joining the treaty, the government of our Republic put forward the proposal to put into effect disarmament and make the Korean peninsula a nuclear-free zone and repeatedly proposed negotiations with the United States while striving to sign a safeguard agreement with the IAEA.

But the United States refused all our proposals and is increasing nuclear threat, constantly building up nuclear armed forces in the south of the Korean peninsula.

This does not accord with the Nuclear Non-Proliferation Treaty itself whose basic idea is to remove the danger of nuclear war and save mankind from nuclear disaster, to say nothing of the publicly recognized principle of the international law that no threat of force should be made or strength be used against territorial integrity and political independence of any state.

This is also contrary to the commitments of the United States itself that it will not threaten non-nuclear nations with nuclear weapons in the future upon the conclusion of this treaty.

As the United States continues to threaten us with "nuclear stick," it has become very difficult for us to sign a safeguard agreement.

If the United States removes nuclear threat against us, we are fully ready to sign it with the IAEA any moment.

It is quite natural for us to demand the removal of direct nuclear threat to our national sovereignty and right to existence as a member nation of the Nuclear Non-Proliferation Treaty.

The United States unilaterally urges the signing of the safeguard agreement while turning a deaf ear to our just demand. This is an act which does not confirm at all with the content of the treaty itself.

This very unjust stand of the United States is endlessly delaying the signing of the safeguard agreement between our Republic and the IAEA.

If the United States truly wants an immediate signing of the safeguard agreement, easing of tension on the Korean peninsula and Asia and removal of the danger of nuclear war there, it must take a step of immediately removing the nuclear threat against the DPRK, rather than shift responsibility on to the other.

Everything depends on the attitude of the United States.

Spokesman Attacks Bush Remarks on Nuclear Issue

SK1607003090 Pyongyang Domestic Service in Korean 2200 GMT 15 Jul 90

["Press statement" by DPRK Foreign Ministry spokesman denouncing U.S. President Bush's statement at the Housion summit meeting of the seven Western industrial states; dated 15 July—read by announcer]

[Text] U.S. President Bush a few days ago issued a so-called chairman's statement as the chairman of the summit meeting of the seven Western industrial states.

In the statement, he said that our Republic is causing grave concern because it has not signed a safeguard agreement with the International Atomic Energy Authority [IAEA] pursuant to the Nuclear Nonproliferation Treaty.

His statement completely distorts the truth. In the statement, the U.S. President completely failed to mention the fact that the United States has deployed numerous

nuclear weapons in the South of the Korean peninsula and is posing a constant nuclear threat against the DPRK.

Entering into the Nuclear Nonproliferation Treaty, the DPRK Government had the natural expectation that this would promote turning the Korean peninsula into a nuclear-free zone, as stipulated in the treaty.

After signing the Nuclear Nonproliferation Treaty, the government of our Republic made efforts to sign a safeguard agreement with the IAEA. At the same time, it made proposals for the realization of disarmament and for turning the Korean peninsula into a nuclear-free zone, proposing negotiations with the United States on a number of occasions.

However, the United States rejected all our proposals, and has instead, continued building up nuclear arms in the South of the Korean peninsula, thus intensifying the nuclear threat. This is a breach of not only the publicly acknowledged principles of international law on not threatening by force or using force against the territorial security and political independence of any state, but also of the Nuclear Nonproliferation Treaty itself, whose fundamental ideals are to eliminate the danger of nuclear war and save humankind from a nuclear disaster. This is also in breach of the commitment announced by the United States itself in connection with the signing of this treaty that it will not threaten nonnuclear member states with nuclear arms.

Under the condition in which the United States continue? to threaten us with a nuclear cudgel, it has become very difficult for us to sign the safeguard agreement. We are fully ready to sign a safeguard agreement with the IAEA at any time if the United States removes the nuclear threat against us.

It is quite natural that we, as a member of the Nuclear Nonproliferation Treaty, should demand that the nuclear threat posed directly against our national sovereignty and right of existence be eliminated. The fact that the United States ignores this reasonable demand we are making and unilaterally urges us to sign a safeguard agreement is an act utterly in discord with the contents of the treaty itself. This unjust position taken by the United States has been delaying indefinitely the signing of the safeguard agreement between our Republic and the IAEA.

If the United States truly desires the signing of the safeguard agreement at an early date, the alleviation of tensions on the Korean peninsula and in Asia, and the elimination of the danger of nuclear war, it should not shift the blame onto someone else, but should take steps to immediately eliminate the nuclear threat against the DPRK. Everything depends upon the attitude of the United States.

[Dated] 15 July 1990, Pyongyang

CZECHOSLOVAKIA

IAEA Checks Temelin Nuclear Power Plant

AU1007084990 Vienna DIE PRESSE in German
10 Jul 90 p 1

[Gerhard Bitzan report: "IAEA [International Atomic Energy Agency] Checked Temelin"]

[Text] Vienna—A commission of nuclear energy experts, which was set up by the Vienna-based International Atomic Energy Agency (IAEA), has found "no major safety problems" during an inspection of the disputed CSFR nuclear power plant in Temelin. This is one of the main statements in an unofficial preliminary report, which has been made available to DIE PRESSE. The final report will be completed in a few weeks time.

The expert commission, which did its work between 25 June and 6 July, is the third and last part of a IAEA inspection program, which was carried out at the request of the CSFR Government. The first two commissions dealt with the suitability of the location and the inspection of construction work. The last commission now dealt with checking the technical design of Temelin, which for the IAEA means the concept, the design, and the type of construction of the facility.

The brief report also says that the design of the "VVER 1000" reactor, which is used in the Temelin nuclear facility, is very similar to the modern light water reactors that are used in other countries. The commission also made some specific recommendations for the improvement of the facility.

There has been harsh criticism, in particular from the Austrian side, of the nuclear power plant in Temelin in southern Bohemia. Even though in the latest government statement Prague came out in favor of expanding nuclear energy production, in mid-June Deputy Premier Dlouhy had stated that the further construction of units three and four of Temelin will be stopped for the time being. A positive report by the IAEA could make Prague end its "pause for thinking things over."

Nuclear Plant Affects Relations With Austria

Vranitzky Asks Calfa for Statement

AU1807172390 Vienna Domestic Service in German
1600 GMT 18 Jul 90

[Robert Stoppacher report]

[Excerpts] Austria now banks on talks with leading CSFR representatives on the hot subject of the Bohunice nuclear power plant. Today Chancellor Vranitzky sent CSFR Premier Marian Calfa a telegram in which he asks for a statement from Prague. Vranitzky recalls Austria's offer to help its northern neighbor to cope with the nuclear power problem. Next week, the chancellor will also discuss Bohunice with President Havel if he comes to Salzburg as announced.

Next Monday [23 July], Environment Minister Fleming will discuss the nuclear power problem with her Czechoslovak counterpart Tirpak. [passage omitted]

Meanwhile the Czechoslovak Embassy in Vienna reported that the Bohunice blocks one and two will be switched off when the new nuclear plant in Mohovce in central Slovakia is put into operation. This will be in two years at the earliest, it was stated.

Vranitzky Interview

AU1807214490 Vienna Television Service in German
2006 GMT 18 Jul 90

[Telephone interview with Chancellor Franz Vranitzky by Elmar Oberhauser in Carinthia—live]

[Text] [Oberhauser] After Environment Minister Fleming announced comprehensive activities to close the Bohunice power plant on yesterday's "Time in Pictures II" program, Vasaryova, the CSFR ambassador to Vienna, said on today's "Time in Pictures I" program that parts of this power plant will be closed down in approximately two years.

Chancellor Vranitzky now wants to comment on these statements from Carinthia, where he is spending his holidays. Good evening, Mr. Chancellor.

[Vranitzky] Good evening, Mr. Oberhauser.

[Oberhauser] Mr. Chancellor, apparently the announcement by Mrs. Vasaryova that the plant will be closed in two to three years is not enough for you. Did I get you right?

[Vranitzky] Yes. This announcement is insufficient because considering that Czechoslovak nuclear expert Beranek, who has advocated nuclear power so far, reported in the past few days that this nuclear power plant is especially unsafe, we cannot be satisfied with the statement that something will happen in two or three years.

[Oberhauser] What would you have expected or what would you expect?

[Vranitzky] Over the course of several years, I had very concrete talks with the respective Czechoslovak premiers on the fact that, first of all, these nuclear power plants in Czechoslovakia alarm the Austrian people very much—which is justified, in my opinion—that, secondly, we Austrians are prepared for scientific cooperation with Czechoslovakia to achieve the greatest possible safety there, and that, thirdly, we are also prepared to provide so much help for Czechoslovakia's entire energy policy that a gradual withdrawal from nuclear energy is possible.

[Oberhauser] Have there been reactions to this?

[Vranitzky] As early as in May this year, I sent a letter to Premier Calfa after a detailed discussion. We established a forum to combat fears of nuclear power in Austria. So

far, I have not heard of any reactions. Today I sent Premier Calfa a telegram in which I ask him to tell us his concrete opinion on the real meaning of the message that this power plant is especially unsafe. I expect a reaction, cooperation, and a response to Austria's proposals and fears. I cannot accept the statement that this unsafe power plant might be closed down in two to three years because it will be replaced by another nuclear power plant. On this basis our relations will not improve.

[Oberhauser] Mr. Chancellor, from the legal point of view, your hands are tied. Are the things that you have said here more than just wishful thinking?

[Vranitzky] Of course, we have no legal means. We cannot force the Czechoslovak authorities. However, I proceed on the assumption that in an era in which international understanding, the falling of borders, and disarmament are considered especially important, one cannot simply pass on to the agenda and say: All right, we have some unsafe nuclear power plants, but this will not turn out to be that bad.

That is, with a view to international understanding, we can, and must, expect our neighbors to respond to our justified objections.

[Oberhauser] Yesterday on the same program, I wished Minister Flemming much success in the struggle against Bohunice. I wish you the same, as well as agreeable holidays. Thank you and good night.

[Vranitzky] Thank you.

Minister Calls for Plant Closure

AU1707194890 Vienna ORF Teletext in German
1805 GMT 17 Jul 90

[Text] Vienna/Salzburg—Immediately after reports on safety defects in the Bohunice nuclear power plant in the CSFR had been published, Environment Minister Flemming appealed to the CSFR Government today to close down the plant. Continued operation is irresponsible, she pointed out.

The FPÖ official [Freedom Party of Austria] from Salzburg, Buchner, appealed to the new chancellor in Prague, Karl Schwarzenberg, to intervene with President Havel to ensure the closure of the Bohunice plant. Schwarzenberg should use his position to avert a nuclear threat, Buchner suggested.

Aid Offered

AU1907183490 Vienna ORF Teletext in German
1631 GMT 19 Jul 90

[Text] Vienna—Chancellor Vranitzky has announced that the Austrian industry will make offers to the CSFR to facilitate its withdrawal from nuclear energy.

Moreover, talks will have to be held with the responsible CSFR authorities, Vranitzky said on the "Noon Journal." The Austrian power supply enterprises also could

build power plants in the CSFR. The chancellor wants to use reserves of the power economy for financing. A long-term repayment can be negotiated, he said.

Vranitzky stressed that the announced closing of blocks one and two of the Bohunice nuclear power plant in two to three years is too late.

Vranitzky Wants Inspection of Plant

AU2007193090 Vienna Domestic Service in German
1600 GMT 20 Jul 90

[Telephone interview with Chancellor Franz Vranitzky by Werner Loew on 20 July 90—recorded]

[Text] [Loew] In a letter to the Austrian Embassy in Prague, Czechoslovak Premier Calfa invited Chancellor Vranitzky to come and convince himself of the absolute safety of the Bohunice Nuclear Power Plant on the spot. I asked Chancellor Vranitzky one hour ago whether he will accept this invitation:

[Begin recording] [Vranitzky] First of all, I really welcome the fact that Premier Calfa answered the telegram that I sent this week so quickly. It is a good opportunity to take up constructive talks with the Czechoslovaks at last. However, I will suggest that he invite experts from the recently established nuclear forum to Czechoslovakia who will not only have a look at the reactors on the spot, but will also talk to Czechoslovak experts. I think that this is far more appropriate than going there myself as I am not an expert and would hardly be able to ascertain if a power plant is safe or unsafe.

I will make efforts to see that the experts of the nuclear forum will be able to go to the CSFR immediately because I will meet Premier Calfa at the meeting of the heads of government of the so-called Pentagonal in Venice on 1 August. I hope that we will have received experts' opinions by then so we will be able to hold political talks and talks on possible economic cooperation.

[Loew] So, Mr. Chancellor, you will not go with the experts?

[Vranitzky] No, this would be rather pointless. I am neither a nuclear physicist, nor a technician or an engineer. I could look at a house or a chimney or something else there, but I would rather rely on the reports of the scientists. After all, Mr. Calfa is not a nuclear physicist either, but a politician, and we will have to draw political conclusions.

[Loew] Thank you very much, Mr. Chancellor. [end recording]

Memorandum to Austria

LD2007203190 Prague CTK in English 1939 GMT
20 Jul 90

[Text] Prague July 20 (CTK)—On the decision of Czechoslovak Prime Minister Marian Calfa, Czechoslovakia

today handed over to Austrian Ambassador to Czechoslovakia Karl Peterlik a memorandum, expressing in it its concern over a new wave of the anti-Czechoslovak campaign in Austria aroused in connection with an article published in the weekly for policy, economy and culture *Nove Slovo*.

The alarming reports around the running of the nuclear power station at Jaslovské Bohunice, West Slovakia, are quite unjustified. In order to prevent further spreading of this campaign, Marian Calfa invited Austrian Chancellor Franz Vranitzky to inspect the power station to convince himself of the safety of the power station.

The Czechoslovak side firmly believes that this step will bring calm to mutual relations and prevent further spreading of anti-Czechoslovak moods in Austria.

Austrian Minister Arrives

*LD2307195990 Prague CTK in English 1818 GMT
23 Jul 90*

[Text] Bratislava July 23 (CTK)—Austrian Minister of Environment, Youth and Family Marilies Flemming arrived here today for talks on problems concerning safety of operation at the V-1 nuclear power plant in Jaslovské Bohunice, West Slovakia.

Last week, Czechoslovak Premier Marian Calfa invited Austrian Chancellor Franz Vranitzky to inspect the power station at Jaslovské Bohunice after he questioned its safety and Austrian activists demanded that the V-1 section of this stations be shut down.

Czechoslovak authorities say that it is safe to operate the nuclear power plant with intensified precautionary measures that have been taken. The plant management is asking Siemens and the Vienna-based International Atomic Energy Agency (IAEA) for independent studies before a decision is taken whether to continue operation, reconstruct or shut down the plant.

Flemming on Nuclear Plant Danger

*LD2307222890 Prague Television Service in Slovak
2000 GMT 23 Jul 90*

[Interview with Marilies Flemming, Austrian minister for family, sport, and environment, by unidentified reporter in Bratislava on 23 July—live or recorded; Flemming speaks in German with superimposed translation into Slovak]

[Text] [Reporter] Mrs. Minister, when we last interviewed you, you spoke about a new stage of development between Czechoslovakia and Austria in the field of ecology. Do you think you were mistaken?

[Flemming] Certainly not. It has been a wish of Mr. Chancellor [Vranitzky] and his colleagues to visit your country. We are happy that you have a new government. Today I have come also to tell you how strong our friendship is for the Czech and Slovak peoples. We are, however, concerned about a number of reports which we

have received in connection with the safety of your nuclear power stations, in particular Jaslovské Bohunice. I think that it is our joint concern. I have come as a minister of the environment to have talks with my colleagues, and I think that we should agree to a joint proceeding against the ministers of the economy, because their interests are different. We, the ministers of the environment, must strive for the maximum protection of the safety and health of our citizens.

[Reporter] You know of the power production situation of Czechoslovakia. Do you think a political or press campaign can deal with this?

[Flemming] We know your heritage well. However, when the question is how to prevent a terrible catastrophe, something similar to what took place in Chernobyl, there is only one way out: A power station like this must be shut down. The Austrian Government has said that it would take on part of the expenses for the energy which we could supply to you. This is a concrete solution.

[Reporter] Why is Austria especially concerned with Czechoslovak nuclear power stations, and why these days?

[Flemming] We are concerned about all power stations, Yugoslav, German, or Hungarian. However, we think that there is a certain degree of security risks. The GDR has also decided to shut down the Greifswald power station because it did not comply with FRG security rules, but we think that Greifswald has been less of a nuclear security risk than Jaslovské Bohunice. Bohunice represents a danger to us all.

Further on Nuclear Plant Talks

*LD2307223990 Prague Television Service in Slovak
2000 GMT 23 Jul 90*

[Text] As the Austrian minister [Marilies Flemming, Austrian minister for family, sport, and environment] continues her talks behind closed doors with our representatives probably even now, we have been briefed on the preliminary results of these talks, two hours of talks, by Federal Minister Josef Vavrovsek:

[Begin recording] [Vavrovsek, in Czech] We have agreed on two basic directions of cooperation: The first is the long-term cooperation in reducing energy consumption and in finding above all decentralized methods of energy production which would utilize nontraditional, renewable sources. The second direction is short-term cooperation, focusing on reducing the risk connected with operating the existing nuclear sources—above all, the V-1 power station in Jaslovské Bohunice. Both sides have agreed that there is no immediate, direct risk of any breakdown. We realize, of course, that in the long term this power station is burdened by two sins, so to speak: first by the fact that it is located in a seismically active zone; and second by the fact that it was designed according to standards enforced at the end of sixties and early seventies—standards which were less strict and

which did not ensure safety to the degree ensured by subsequent standards. Despite this, there is no direct source of danger, however.

[Unidentified reporter] In this regard, international expert opinion has also been discussed, right?

[Vavrovsek] This is the basis of the whole future approach. We, independently of the fact that now our Austrian colleagues have come up with the idea that something should be done quickly, long before this, we, the Czechoslovak side, asked the International Atomic Energy Agency to carry out our expert checks in the framework of a routine operation program—this should take place in the first 14 days of October, and, besides this, colleagues from the Slovak power generating enterprises have asked experts from the FRG specializing in improving the quality or increasing the safety of power stations, and who have gained experience at a power station of the same type in East Germany, in Greifswald—to carry out expert studies. This will take place next month, specifically on 7 August, and will focus on estimating risks connected with operating the Bohunice nuclear power station, because every power station is a potential source of risk, and the main task is to contain it within acceptable limits—that is, within internationally recognized limits. [end recording]

Tirpak Statement

LD2407202790 Prague CTK in English 1853 GMT
24 Jul 90

[Text] Bratislava July 24 (CTK)—Slovak Minister Ivan Tirpak told CTK today that during talks with Austrian Environment Minister Marilies Flemming in Bratislava yesterday the Czechoslovak side went to the limits of its possibilities to meet Austrian Demands.

Although no communique was adopted, it cannot be said that the conclusions were not positive, the minister said. He explained that Czechoslovakia could not back up on the wording that Austrian experts would have observer status on a Siemens commission to conduct a study of the Czechoslovak nuclear power station at Jaslovské Bohunice near the Austrian border because it could not promise them information patented by Siemens and the Soviet Union.

He said that since 1986, i.e. long before the present protests in Austria, Czechoslovakia has been carrying out a program to increase the originally designed safety of the V-1 nuclear power station. The Siemens expertise [as received] is to start on August 7. There will also be a study by the International Atomic Energy Agency in October. Czechoslovakia will decide on the basis of their results, the minister said.

In Vienna, Chancellor Franz Vranitzky said today that Austrian energy supplies to Czechoslovakia during a shutdown of the V-1 plant were conditional on the participation of experts of the Austrian Forum for Nuclear Issues in the inspection at Jaslovské Bohunice.

It is inconceivable that experts of the Nuclear Forum have only observer status, he told the APA news agency. Austria is greatly interested in the shutdown of dangerous nuclear facilities close to its borders and for this reason is prepared to support their closure.

Situation Assessed

AU2507130790 Bratislava NARODNA OBRODA
in Slovak 20 Jul 90 p 6

[Ivan Horský commentary: "Dialogue Yes, but Without Conditions"]

[Text] The exceptionally rapid development in relations between our republic and neighboring Austria are clouded again, due to the gnawing problem surrounding nuclear energy, specifically, due to the first two blocks of the V-1 power station in Jaslovské Bohunice.

The controversy discussed in the Austrian mass media and subsequent declarations made by politicians in Vienna are based on the assumption that Jiri Beranek, Czechoslovak Nuclear Commission chairman, allegedly declared that due to serious problems, both blocks should be shut down in order to avoid a possible repeat of the Chernobyl tragedy.

In her first reaction, Magda Vasaryova, CSFR ambassador to Austria, declared that the blocks would be shut down, but only after two to three years. This is understandable, since our energy balance sheet is very tight and recent developments in the supply of liquid fuel only make it tighter.

Chancellor Franz Vranitzky who, among other things, requested that Federal Premier Marian Calfa react properly to Austrian fears and worries, also participated in the discussion in a decisive manner. Marilies Fleming, Austrian environment minister, let herself be heard, too. She appreciated our government's intention to shut down the operation of the two blocks, yet she spoke on behalf of the complete closure of the Bohunice power plant. This happened despite the assurances given by our authorities that the remaining two blocks are completely safe.

I fully understand Austria's worries, which mainly originate from the fact that our power plants are located near its border. I also accept the decision made by (a minority of) the population which, long before Chernobyl, gave a "red light" to nuclear energy. They could do so. Austria, as a mountainous country, has unused hydro potential, namely in the Alps, yet the planned construction of hydro power plants has been postponed until an uncertain date—or until it becomes necessary—due to the population's resistance.

We, as opposed to Austria, do not have such reserves. The energy policy of the past 40 years has left behind unremovable traces. We are in a so-called vicious circle. Bound by international agreements, in which Austria is a participant, we are forced, in the interests of improving the ecological situation in Central and in all of Europe, to

reduce harmful emissions coming, in particular, from the brown coal power stations.

But, on the balance sheet, there will be a power deficit. This is why, based on many criteria, we have to develop nuclear energy, while, of course, respecting maximum quality and safety. The protection of our populace and that of neighboring countries is the issue. This is why we have concluded agreements in this direction with Austria and why we invite renowned experts from foreign countries to independently evaluate the projects as well as their implementation. Of course, we have reserves, as far as reduction in consumption is concerned, yet the reconstruction of our economy within a day would be impossible.

It is a strategic and therefore a political question. We cannot rely only on outside help; nor will power supplies from Zwettendorf solve our problems completely. This does not mean, however, that we are refusing cooperation and help. We are not avoiding dialogue about problems. We are asking, however, for an understanding of our problems, too. What we are refusing is a knife being held to our throat. No one likes that.

Vranitzky on Talks With Havel

LD2607204290 Prague Domestic Service in Czech
1930 GMT 26 Jul 90

[Text] Further Austrian protests against nuclear power stations in Czechoslovakia accompanied the visit of Czechoslovak president in Salzburg today.

Vaclav Havel discussed this question briefly with the Austrian President Kurt Waldheim.

The chancellor, Franz Vranitzky, announced on this occasion that on 30 July a high-ranking representative of the Czechoslovak Federal Committee for the Environment will arrive in Vienna. The chancellor added that he will also have talks next week with Czechoslovak Premier Marian Calfa on the issues of energy policy. He emphasized that Austria's concerns and objections against nuclear power do not represent any anti-Czechoslovak moods.

Havel Invites Austrians To Check Plant

AU2707120890 Vienna WIENER ZEITUNG
in German 27 Jul 90 p 1

[Excerpt] Salzburg—Czechoslovak President Havel has formally invited Austria to participate in the safety inspection of CSFR nuclear reactors. Austria can do this either alone or together with other bodies, Havel said in a talk with President Waldheim and Chancellor Vranitzky on the sidelines of the Salzburg Festival. Chancellor Vranitzky will also discuss questions of CSFR energy policy with Czechoslovak Premier Marian Calfa next week.

On Wednesday [25 July] the Chancellor's Office published Chancellor Franz Vranitzky's letter to Czechoslovak Premier Marian Calfa, in which the chancellor asks for an overall inspection of the Bohunice nuclear power plant, which is close to Austria's border, and expresses Austria's readiness to make up for the CSFR's energy losses resulting from it.

The fact that the inspection of the Bohunice nuclear power plant that had been planned for the fall has been moved up to August proves that the CSFR is now also thinking about this matter, Vranitzky stated at a news conference in Salzburg. Now cooperative alternatives to nuclear energy have to be considered, he said.

The chancellor mentioned a joint natural gas pipeline from Norway to central Europe as an example. [passage omitted]

Discussions Inconclusive

AU2707135490 Prague HOSPODARSKE NOVINY
in Czech 26 Jul 90 p 2

[Jozef Drab report: "Czechoslovak-Austrian Talks on the V-1 Power Station: So Far Without Specific Results"]

[Text] Talks between Austrian and Czechoslovak delegations on the operation of the V-1 nuclear power station at Jaslovské Bohunice were held in Bratislava at the beginning of this week. They were attended by Marilies Flemming, Austrian minister of family affairs and environmental protection; Gabor Zaszlos, Slovak deputy premier; Minister Josef Vavrousek, chairman of the Federal Committee for the Environment; Minister Ivan Tirpak, chairman of the Slovak Commission for the Environment; as well as by experts in the field.

The talks proceeded relatively smoothly, were marked by a constructive spirit, and it seemed that they would result in a joint communique. This did not happen and, in the end, the talks did not lead to any specific conclusions. We asked Ivan Tirpak, one of the participants in these talks, why. He said that the talks concerned the specific situation at Jaslovské Bohunice from the viewpoint of safety. The Czechoslovak side pointed out that the article by Engineer Jiri Beranek, expert of the Czechoslovak Atomic Energy Commission, [in the 14 June issue of the Slovak weekly NOVE SLOVO] which stirred controversy over the operational safety of this power station, provides a realistic account, although it contains some inaccuracies. However, it is taken out of context. Since 1986, Czechoslovakia has been implementing a comprehensive program designed to raise the originally projected and implemented safety parameters of the V-1 nuclear power station. This program has been implemented for four years and, as such, was not adopted in response to the present reaction in Austria. The Czechoslovak officials involved in the issue have advanced an offer to the Austrian partners to participate in the survey to be conducted by the Siemens company at Jaslovské Bohunice as of 7 August this year. Siemens carried out a

survey on a similar power station in the GDR. The Austrian side accepted the offer, as it had introduced the group which carried out the survey in the GDR. [sentence as published] The agreement was reached to issue a joint communique.

The problem is that the Czechoslovak side had not consulted Siemens in advance to inquire whether it was willing to accept a third side in the group of experts. This has prolonged the talks. For this reason the CSFR was unable to promise that even information which is protected by Siemens would be available to the Austrian side. This prompted Mrs. M. Flemming to disagree with the formulation in the joint communique that the experts nominated by Austria would have only observer status in this commission and that they would not have access to Siemens, but only to Czechoslovak information.

Independently of the Siemens survey, the International Atomic Energy Agency will carry out a survey [at Bohunice] this October. The results of both will be synthesized and published. At any rate, it is up to the Czechoslovak side to make any decisions [on the basis of the experts' recommendations], I. Tirpak said.

Regarding the Austrian side's offer to help Czechoslovakia with energy supplies, the chairman of the Slovak Commission for the Environment said it is currently impossible to import energy from Austria, owing to the problematic state of transmission lines and problems with securing (other) channels of transport. Apart from this, the energy situation of Austria itself and its dispositions are known to us. Austria can supply some energy to us only in the brief summer period. In the winter months, on the other hand, the Austrian grid itself relies on imports.

Nuclear Plant Safety Reevaluated

*LD2507152290 Prague CTK in English 1419 GMT
25 Jul 90*

[Text] Prague July 25 (CTK)—Safety of Czechoslovak nuclear power plants is being reevaluated at present and will be discussed by the Federal Government tomorrow, Josef Vavrousek, minister in charge of the Czechoslovak Federal Committee for the Environment, told CTK here today.

Minister Vavrousek, who was asked by CTK to comment on the recently published articles in foreign press, above all in the Austrian papers, on safety problems in the Czechoslovak nuclear power plants, said that the Czechoslovak public will be informed of the results of the government's discussions immediately.

Josef Vavrousek was entrusted with state control over Czechoslovak nuclear power plants safety by the Federal Assembly at its session on July 19, 1990.

New Incidents at Bohunice Plant Reported

*AU2307205590 Hamburg DER SPIEGEL in German
23 Jul 90 pp 112-116*

[Unattributed report: "No Premiums Without Megawatts"]

[Excerpts] Slovenliness, low safety standards as a consequence of poor technology, and continuous accidents are nothing out of the ordinary in CSFR nuclear power plants: Internal reports of the Prague Nuclear Commission have shown that the oversized CSFR nuclear energy program is becoming a severe test case for the young democracy. [passage omitted]

Frightening conditions have, above all, been reported from Jas'ovske Bohunice. Only 60 km northeast of Vienna, two major catastrophes almost took place at the Bohunice plant in the seventies.

In spring 1976, the "A 1" reactor, a gas-cooled prototype developed in the CSFR, was on the verge of a meltdown. Under full pressure, the lid of fuel canal came off; the fuel cassette was ejected, hitting and killing one worker while two others suffocated due to the hot gas. A major nuclear disaster like Chernobyl was prevented only thanks to the bold effort of one worker, who provisionally closed the open canal by means of a reloading machine a few minutes later.

Twelve months later, the staff ignored the temperature reported from the reactor core; several fuel elements melted through, all pumping and canal systems were damaged or exposed to radiation.

The site of the power plant and the subsoil continue to be polluted as a consequence of these accidents and the incorrect storage of radioactive refuse. According to reports by members of the local control authority in the special journal NUCLEONICS WEEK, they found up to 24,000 becquerel from tritium per liter, and more than two million becquerel from cesium per one kilogram earth in the soil around the plant—ten times as much as the maximum allowable amount per square meter in the FRG.

Right next to the closed hazardous reactor, two "V 1" and "V 2" blocks with two pressurized water reactors from the early days of East European nuclear technology are still in operation.

The "V 1" block, which is the same design as those in the GDR plant at Greifswald, which have now been closed and are described as extremely risky, is the "weakest link in the CSFR nuclear power chain." [passage omitted]

A report intended for the government explains that because of "the limited possibilities for technological control, it is impossible to establish the amount of the material damage, which makes it impossible to estimate the remaining lifespan." A spokesman of the Nuclear Commission has stated that presumably the boilers of the "V 1" have become as brittle as those of the

Greifswald reactors. Ilse Tweer, a specialist for the testing of material from Hannover, who also examined the boilers at Greifswald, warned that if this were the case, "then emergency, even caused by little leaks, might cause a disaster."

The materials test expert has noted that the brittle steel threatens to break at the very moment at which the danger of the greatest conceivable accident occurs at a reactor—that is, when the emergency cooling system is put on, during which the temperature in the boiler is brought down suddenly through cold water.

These defects appear to be even more precarious when considered in the context of experiences gained in the normal operations of the "V 1," which were recorded by the Nuclear Commission in its annual reports over the last two years:

- In seven of the twelve pipe sockets of the pressure vessel in block 1 and at six sockets in block 2, during the annual inspection the staff discovered deep cracks, which it simply "repaired through grinding and welding."
- At various instances, and in line with the principle that "no bonuses without megawatts" (as one of the staff in the nuclear power plant put it), the staff of the plant turned off the automatic emergency shutdown system so that the plant would not shut off, despite the fact that various components had broken down.
- At two occasions, in May and July 1989, the cables of one of the main circulating pumps in block 2 melted down; however, the reactor was operated with the remaining pumps for weeks and nobody ever looked for the true reasons of the short circuit. [passage omitted]

Officials Discuss Problems of Bohunice Nuclear Plant

Nuclear Safety Chairman Interviewed

AU2407125790 Prague SVOBODNE SLOVO in Czech
21 Jul 90 pp 1, 3

[Interview with Karel Wagner, chairman of the Czechoslovak Atomic Energy Commission, by Martin Fuk; place and date not given: "Will We Halt Bohunice?"—first paragraph is SVOBODNE SLOVO introduction]

[Text] The V-1 nuclear power plant at Jaslovské Bohunice has recently become the object of another Austrian press campaign against our nuclear program. It developed as a result of an article in the Slovak newspaper NOVE SLOVO [New Word] in which Engineer J. Beranek, an employee of the Czechoslovak Atomic Energy Commission, spoke about the V-1 nuclear power plant. We asked Engineer Karel Wagner, chairman of the Czechoslovak Atomic Energy Commission, for his point of view on the campaign.

[Wagner] First of all, I want to stress that it is, to say the least, very strange that Engineer Beranek's article was published on 14 June and that the Austrian press only began its outcry one month later. The article contained generally known and technically correct data that described some incidents which, even at the time of publication, were unsubstantiated.

[Fuk] Does this mean that safety at the V-1 plant has increased?

[Wagner] The plant's blocks were put into operation in 1978 and 1980. We neither concealed their technical level nor the risk. However, nuclear safety requirements at that time were at a much lower level throughout the world than they are today. As they gradually increased, several measures were implemented in the V-1—for example, by breaking down the peripheral fuel panels, the amount of neutron radiation in the reactor's pressure vessel was reduced, additional diagnostic equipment from the FRG was installed, and our own equipment, which increased capacity in searching for defects in the primary ducts, was also installed. Moreover, along with the USSR, the GDR, and Bulgaria—the states operating this first generation reactor—we have adopted a set of 16 fundamental measures which will bring the level of nuclear safety into line with current requirements. These measures will be implemented before 1992.

[Fuk] We have encountered speculation about a recent large emission of radioactivity caused, apparently, by sabotage. Could you tell us something about this?

[Wagner] I can only deny this speculation. Minor incidents, which do not cross the plant's threshold, take place in each nuclear power plant. Such events are monitored by the Czechoslovak Atomic Energy Commission and are regularly made public. Such instances are far fewer at the V-1 than at our other nuclear power plants. This is because this plant has the lowest level of nuclear safety of all our nuclear power plants and is therefore monitored and controlled very closely.

[Fuk] The V-1, then, is not in a parlous condition?

[Wagner] No. It is capable of operation and is not immediately endangering anyone. The risk of an accident has been further reduced by the measures that have been introduced; however, the public's perception of this risk has altered much more significantly—its unwillingness to put up with the risk, however small, has increased.

[Fuk] Will you recommend halting production at the V-1 plant if the Austrian Government really demands it?

[Wagner] Of course we do not envisage that the V-1 will remain in operation for the entire period of its projected viability, but we will not halt production tomorrow, for instance. The state inspector has demanded the drafting of a new safety report for the end of the third quarter. At the beginning of October, an International Atomic

Energy Authority commission will be set up to investigate security issues at the V-1. After all the conclusions have been evaluated, a decision will be made on the plant's future operation, reconstruction, or suspension. However, the decision will be made on the basis of a thorough scientific analysis and on the basis of absolute responsibility for the population's safety; it will not be made on the basis of a distorted and incompetent press campaign.

Bohunice Director on Plant's Safety

AU2407134090 Bratislava NARODNA OBRODA
in Slovak 21 Jul 90 p 1

[Text] Jaslovske Bohunice, CTK—Adolf Krstenik, director of the Jaslovske Bohunice nuclear power plants, emphasized in an interview with CTK reporters that the V-1 blocks are the oldest in our country, but that even older ones are still in operation within CEMA. We are also aware of the fact that they do not meet the same safety standard as the majority of blocks in advanced countries or the new blocks being constructed in our country. Thus, the Austrian activists' points of view are nothing new to us. We do not underestimate the issue of safety guarantees for the V-1's operation. We have prepared a program to increase safety by adopting diagnostic, anti-seismic, technological, and anti-fire measures from the well-known Siemens company. We are also making use of an offer from an International Atomic Energy Authority team in Vienna to conduct a comprehensive inquiry into safety. On the basis of these independent points of view, a decision can be made on the blocks' fundamental reconstruction or on halting their activity.

General Director Outlines Uranium Industry Plans

AU2407152090

[Editorial Report] Prague HOSPODARSKE NOVINY in Czech on 19 July on page 2 carries a 800-word article by Richard Stregl entitled "Uranium Industry at Crossroads Again." The article is based on the author's undated interview with Jaroslav Svoboda, general director of the Czechoslovak Uranium Industry, and deals with Svoboda's plans for the industry's future.

The opening part of the article deals with Svoboda's fate during the last 20 years, which he spent in "domestic exile" because of his attempt in 1968 (when he was deputy general director) to change the Czechoslovak uranium industry's one-sided orientation as supplier of the Soviet Union.

Speaking about his present plans, Svoboda says: "The program for the development of the uranium industry can be divided into the so-called vertical and horizontal programs. The aim of the vertical program is to move away from the simple extraction of uranium to its processing and to building an industrial branch in the true sense of the word. Fuel for nuclear power stations,

which has until now been produced for us from our own uranium in the Soviet Union, should be its top product. The enrichment of uranium, which is a technologically too demanding activity, would continue to be provided by the Soviet Union or by some other country if it offers more advantageous terms.

"The horizontal program should meet two objectives. First, creation of jobs for miners eliminated from active service in the mines and, second, improvement of the balance sheet of the future joint stock mining companies."

According to Svoboda, Czechoslovakia would also like to enter the "world market for uranium." Asked how he intends to go about it, given the fact that this market is "controlled by the countries of the so-called uranium club" and the "outsiders" are forced to sell at two to three times lower prices, Svoboda says: "Apart from long-term contracts, we can rely only on the personal contacts of people who command influence with firms which control the market." In this context, Svoboda mentions Karel Bocek, director of the Czechoslovak Uranium Industry in 1968, who emigrated to the FRG after 1968 and is now an "acknowledged world expert in the field."

Stregl concludes his article by saying that "in view of the approaching declassification of all data on the uranium industry," HOSPODARSKE NOVINY will "soon return" to the problems of this industrial branch.

Secret Report on Nuclear Commission Detailed

Frequent Incidents

AU2007124190 Vienna Domestic Service in German
0500 GMT 20 Jul 90

[Fritz Pesata report]

[Text] Before the sensational interview given by the CSFR nuclear commission to the Slovak weekly NOVE SLOVO as well as an interview in the Inlandsreport news magazine of Vienna Television in April this year, the only thing—only between quotation marks—one knew about Bohunice was that in 1977 there was a severe reactor accident, in which—officially—two people died.

The report for the year 1989 of the Nuclear Commission of our northern neighbor has now revealed that incidents, particularly in the two blocks of the plant that belong to the first generation and were constructed as early as in 1970, are nothing out of the ordinary so to speak. In 1989 at total of 364 incidents were dealt with in the course of inspections at the Bohunice plant, one percent of which were regarded as significant by the state nuclear commission. The report on the two older blocks of the plant, Bohunice 1 and Bohunice 2, literally states that their security does not comply with current standards, and that these two blocks were described as the weakest links in the CSFR nuclear energy chain in the 1986 government report, which was of course never

made available to the public. Last year, these blocks called V 1, showed a total of 77 and 85 incidents respectively. On two occasions the plants had to be shut down immediately. The report of the commission includes the following:

On 5 June 1989, two minutes after midnight, the main feed-water pump number 11 was turned off through an electric interference, and at the same time, the electric fire signals went off at the plant's fire brigade station. The staff in the machine hall noticed smoke in the room of the draft tube of pump number 11. After it was established that the fire broke out in the cable chamber, the block was switched off by hand on the instructions of the shift engineer at 0016.

In other words, it was possible to discover the fire only 15 minutes after the first alarm and to switch off the block by hand. The second case is also documented in the report of the nuclear commission:

On the morning of 5 March 1989, the pipe of the block was reduced in order to carry out the planned tests of the turbo generators number 41 and 42. In the course of this the feed-water control unit for steam generator number 43 broke down. The staff switched on the automatic emergency control for the regulation of the water level. Subsequently the faulty driving mechanism of the control unit was exchanged. After turbo generator number 41 was uncoupled the new driving mechanism was tested. It was found out that the driving mechanism worked the wrong way round. During this the water level in steam generator number 43 increased. Closing the emergency valve did not prevent the increase of the water level to 200 mm, which led to the switch-off of turbine number 42 and subsequently to the emergency shutdown of the reactor.

These are two examples of so-called incidents. In the past year there were also several cases of damaged cable junctions. The CSFR nuclear commission particularly criticizes the insufficient precautionary measures for the case of an earthquake. After all, the Bohunice nuclear power plant is very close to a zone that has been known as a seismic area for centuries. Yet the (Sias) system, which was installed on the first block only in 1988, only fulfills its function—quote—in an unreliable way; it is inadequate for joining with the emergency shutdown system, and it does not fulfill the requirements of other emergency shutdown systems.

Safety Assessed

*AU2107182090 Vienna Domestic Service in German
1000 GMT 20 Jul 90*

[Fritz Pesata report]

[Text] Jiri Beranek, head of the CSFR Nuclear Commission, was right when, in several interviews, he described the two oldest reactors of the Bohunice nuclear power plant literally as the weakest link in the CSFR nuclear energy chain. However, one must also critically assess

the security standards of the reactors of the second generation at Dukovany, as well as the reactors at Mochovce, which are still unfinished or have not yet been put into operation, and the four reactor blocks at Temelin, which can currently only be recognized by the outlines of the growing cooling towers.

Let us take the case of Dukovany, which is about 30 km to the southwest of Brno, has three units of the second generation of the Soviet WWR-440 reactor, and went into the grid between 1985 and 1986; the state nuclear commission has expressed the following—not exactly flattering—opinion, quote:

The state inspectors regarded as significant incidents the low intensity of natural circulation of the cooling water in the primary circuit while the third block was shut down to exchange the fuel rods and the emergency shutdown of the second block, in which the rotary motion of the turbine was so high that the protective system to prevent over acceleration was put on. For this, the key for the emergency shutdown of the turbine was not adequate. At the same time the computer information system's data were lost. End of quote.

Another example of the unpublished CSFR nuclear report is on the four blocks of Mochovce. Here the inspectors frankly state, quote:

The investor did not know what was supplied and how the supply was stored. With regard to Mochovce it was also stated that the technological documentation was incomplete and that there was an incongruity between the data in the computer and reality. It was also noted that several supplies were implemented without assuring that the required quality guarantees were observed beforehand. Yet the most serious problem of Mochovce seems to be the automatic control system, which is permanently being developed, and whose elements were not examined under conditions that correspond—at least in part—to the real conditions.

In other words, this means that at the moment the new control technology is being examined in Kiev together with Soviet engineers. Should it turn out that this new technology does not work, one would have to get hold of substitute Western technology. However, in that case it will not be possible to put Mochovce into the electricity grid in two years time, as planned. Moreover, bad feelings and resistance are now emerging in Hungary against this nuclear power plant close to the border—not least because now there are even plans to set up a nuclear waste disposal site near Mochovce.

Finally there are the projected four blocks of Temelin in southern Bohemia. Unlike Bohunice, Dukovany, and Mochovce, Temelin is to be equipped with WWR-1,000 reactors. The positive thing about this is that this reactor type has a so-called containment chamber, that is to say, a security shell. On the other hand, the report by the CSFR Nuclear Commission states literally, quote:

Experiences from such blocks that are in operation in the USSR and in Bulgaria confirm that their operation is difficult to control and thus, must unstable. End of quote.

Temelin Nuclear Power Plant Completion Not Decided

90CH0243D Vienna DER STANDARD in German
15 Jun 90 p 5

[Text] Gothenburg/Linz—Czechoslovakia will for the time being suspend construction on blocks three and four of the controversial southern Bohemian nuclear power plant in Temelin and by the end of the year will reach a definitive decision on the form in which the power plant will be completed. This was the message given by Deputy CSFR Premier Vladimir Dlouhy to Minister for Economic Affairs Wolfgang Schuessel on Thursday during the EFTA [European Free Trade Association] conference in Gothenburg.

Dlouhy said that he would vouch for the fact that a halt on further construction on blocks three and four pending further consideration is in force effective immediately, and that all building activities have been interrupted. However, further construction on blocks one and two is under way according to schedule.

The Green Alternative of Austria warned that blocks one and two of the Bohunice nuclear power plant in the CSFR are the same type of reactor as the GDR power plant in Greifswald, which is being closed down.

POLAND

Dangers Posed by GDR Nuclear Plants; Spent Fuel Transit Examined

90WP0103A Warsaw POLITYKA in Polish No 21,
26 May 90 p 6

[Article by Roman Czejarek: "Glowing Trains"]

[Text] In the course of the last two years, the NORD nuclear power plant malfunctioned 1,191 times. That is what is indicated in the documents that the East Germans presented to the International Atomic Energy Agency. The four working reactors are practically unfit for use. The attempt to start up the fifth power unit, which is the newest, for the third time ended in a fiasco. Such is the outcome of 15 years of operations of the only atomic power plant in the GDR.

Construction of the NORD power plant was started at the beginning of the 1970's in the small town of Lubmin, near Greifswald in the northern part of the GDR. The first reactor was started up in 1974. The next three were started up in 1975, 1978, and 1979.

The project was based on the obsolete designs of Soviet WWER-440 nuclear reactors, of the W230 type, which belong to the second generation of reactors which was developed in the 1960's. A few years ago, construction of

four successive power units of the more modern W213 type was begun in Lubmin. The first of them has for a long time been in a phase which is grandiloquently called "the state of trial exploitation."

It has been said for a long time that our neighbors beyond the Oder have been having quite a few problems with NORD. Several thousand workers from nearly all of the "people's democracies" have been residing there during the period of construction. However, those who gladly told, while home on leave, about what they had seen in the GDR have not been returning to work. But for Polish enterprises, the construction of the NORD nuclear power plant was pretty good business. Nearby—and well-paying by East European standards—work attracted workers who were not conscious of the dangers.

The West German Greens reacted the quickest. Officially, the source of their information was a Hungarian emigrant who had worked under contract at Lubmin for many years. However, looking at the importance of the detailed data he revealed, it is difficult to believe that the Germans would allow a citizen of a foreign country access to such important documents—even if he was the supervisory engineer on the construction site.

NORD's basic flaws were caused by imperfections of design, the low-grade materials used in construction, and horrible quality. It is generally known that an ideal nuclear power plant will never be built, but it can be designed to reduce danger to a minimum. In the GDR, this was not done.

Neither the reactors nor the primary steam circulation systems possess the containment structures required around the world. This means that even if the electric plant works in an ideal manner, an airplane crash, for example, can lead to catastrophe. And airplanes traveling from Berlin to Sweden fly over Lubmin—not to mention military vehicles.

In the event of small leaks from the primary circulation system, supplementary water is injected by special pumps. In the event of greater leakage, NORD is completely helpless. Its system of providing extra water can make up for a break in a pipe of up to 50 mm in diameter (this is West German data; Strupczewski, who is chairman of the Commission for Nuclear Safety and Radiation Protection of the Council on Atomic Science, says 100 mm). At the same time, contaminated water flows into a main drain in Lubmin that is 500 mm in diameter!

An interruption of the supply of electrical energy to the pumps (no one thought of any sort of emergency supply) leads to the sudden evaporation of the cooling water in the course of a few seconds. After Chernobyl, we know what sort of threat is posed by a meltdown in the reactor's core.

A serious threat is posed by the lack of a so-called controlled combustion system to neutralize the hydrogen that is released during an accident. Unneutralized, it

forms an explosive mixture with oxygen. The application of combustible electrical cables and seal wires can be called by the name of technical sabotage.

Nuclear Skansen Museum

Appalling data was presented after the pressure vessels working in the first four power units of the reactors were examined. As a result of neutron irradiation, the fragility of the elements supplied by the USSR rose to such an extent that the threat of their immediate rupture forced the Germans to shut down power units numbers 1 and 2. The erosion of material caused the thick steel walls to literally disintegrate as though they were grains of sand stuck together. Moreover, this is just one of the effects of the practical lack of control over the quality of materials supplied and the work performed.

For many years, just three or four inspectors were working in Lubmin, and they were being paid by the management of the power plant. When they did not voice reservations, the whole work crew, which numbered several thousand, received large bonuses. The conditions and demoralization at the construction site were once described by the West German magazine DER STERN under an unambiguous title which may be freely translated as "disorder and alcohol."

"We took over work from the Hungarians," Polish workers from NORD said. "Although theoretically everything had already been accepted by the inspectors, we often came across unwelded sections of pipe, holes, and ruptures. People from the Far East worked the worst. Many of them did not know what they were doing."

So far, the one specialist who has dared to tell of his impressions without benefit of anonymity is Dr. Maciej Jarmusz, an automation engineer from Szczecin.

"I do not glow yet," he says of himself, "in spite of the fact that I worked for more than half a year at Lubmin. So far, there have not been any catastrophes, thanks solely to the responsibility of the specialized German crew, which has already dared several times to react correctly, even though this meant the destruction of much valuable equipment."

The reactor shows microruptures. The steam producers are of an area equal to the grandstand of the Decade Stadium [in Warsaw]. In accordance with the old Soviet standard that is still in force(!), each of them releases four liters of contaminated steam into the atmosphere per hour. Four liters multiplied by four producers multiplied by four reactors multiplied by 24 hours per day yields many hundreds of liters of radioactive aerosol floating in the wind. In the West, all valves are tightly closed and there is no place for such a phenomenon. The Germans have constant trouble with pressure: a cloud of steam hovers continuously over the power plant. Ventilation from ordinary openings in the lateral walls removes contaminated particles from the reactor hall. It is not

known precisely how much environmental contamination this causes, and, furthermore, the hall itself is not air-tight: during a downpour, it rains inside.

Like everything else, the control-measurement equipment and the safety equipment are Soviet products. Many instruments work poorly. Western standards require that safety equipment be designed so that in the event of an accident, all activities during the first half hour would be executed automatically. East of the Elbe, the guarantee of certainty is guarded by a few low-quality gauges and a person supplied with a multivolume set of instructions.

Professor Jan Tomaszewski has fought for a long time, so that everyone might know what NORD really threatens us with:

"In recent years, we have written petitions to the authorities. We asked for the beginning of appropriate talks with the GDR. Unfortunately, the answers always included just a vague statement about good cooperation with our friends and the assurance that no danger exists. And when Polish workers wanted to be equipped with personal dosimeters they received threats that they would be fired."

Accidents Every Other Day

In 1989, the editors of DER SPIEGEL addressed the issue seriously. A cycle of publications elicited such indignation in East Germany that the Western journalists were threatened with a lawsuit. In spite of that, there were more and more press leaks about scores of accidents in Lubmin and about the fact that several times we were a step away from nuclear catastrophe. At this same time, the Polish Atomic Energy Agency, which noticeably fears that the NORD issues not be linked to Zarnowiec (equipped with Soviet WWR-40 reactors), testified that one may believe the assurances of the GDR that everything is in proper order, because "in our work together up till now . . . not one instance has occurred in which the German side did not perform the duties it took upon itself."

And what duties were the Germans to perform?

At the beginning of the year, GDR television, which was already freer, showed a report in which the director of the NORD power plant was put in a tight corner and could not defend himself against the simplest reproach.

Finally, in March, the long-awaited summary report of the International Atomic Energy Agency of Vienna appeared. The agency had visited Lubmin from 12 to 16 February of this year. In the last two years, there occurred on the grounds of the power plant . . . 1,191 (one thousand one hundred and ninety-one) accidents. Dividing this by four reactors, this means that each of them broke down on the average of every other day. Six of the most serious accidents were treated with particular care, because the remaining 1,185 were counted as

accidents with no radiological threat. This can be compared to an automobile in which during 24 months, a mirror broke or a window popped out or a door handle fell off or a seat split more than one thousand times, and the wheels suddenly came off just six times (by chance, this always occurred just when the vehicle was slowing down or was parked). The last three of these six accidents occurred in May, September, and October of 1989.

The authors of this report analyzed what in their opinion was the most threatening accident in the history of the NORD power plant. It occurred on 7 Dec 1975. As a result of a fire among electrical wires, the power supply to the cooling system pumps was interrupted for seven hours. We have only the typically Soviet, massive construction of the reactor to thank for the fact that its heat capacity was large enough that water from the secondary circulation system completely evaporated after only five hours. Afterwards, the water of the primary circulation overheated, but fortunately by a miracle they managed to restore the power supply and the reactor's core remained undisturbed.

The one East German atomic power plant in operation was rated as particularly accident-prone. The reactors, which were planned to last for more than 20 to 25 years, have disintegrated after a much shorter time. Numerous improvements, so-called annealings, may barely lengthen their life by a few years. Later, reactivation of the nuclear Skansen museum will be completely unprofitable.

Phosphorescent "Wonder"

The working NORD poses the biggest threat to, above all, the residents of Szczecin (about 100 km away) and Swinoujscie (about 50 km away), but the transport of highly radioactive wastes from Lubmin to the Soviet Union poses a problem for Poland in general.

In accordance with international agreements, the USSR, in selling its atomic power plants, simultaneously guarantees to take away the so-called hot wastes of spent nuclear fuel, which thanks to further processing are used in the construction of nuclear warheads. The used fuel is loaded into special containers capable of withstanding a head-on collision with a train. Since the load creates great quantities of heat, the railcars are equipped with special cooling installations and heavy casings (something like a massive refrigerator car). In spite of this, a delicate afterglow, which is visible in the darkness, hovers around the train, which is made up of a few heavily guarded cars!

Glowing trains such as this have been travelling through Poland for many years. From the beginning they caused a considerable sensation. PKP [Polish State Railroads] workers, unconscious of the hazard, pointed them out to each other. There were cases of children being taken to the tracks, so that they could see the phosphorescent "wonder." The reason that no one was informed, as the BHP [occupational health and safety] railroad inspectors explained with disarming sincerity, was that instructions

R1 and R34, which regulate the principles of transport, were, together with their annexes, in part confidential or secret, and therefore only official employees of more important stations were informed of their contents.

According to official data of the PKP, the glowing trains came into our country regularly four times a year. The trip through was safeguarded by the great strength of the MO [Citizens Militia], the SB [Security Service], the Railroad Security Service, the Fire Department, and many other specialized organizations. The convoy went on a separate track from Kostrzyn through Krzyz to Pila, Chojnice, and on to the east. A special protective train accompanied it, insuring it against possible damage from the rails. The entire trip was personally supervised by high railroad officials. The German side paid us several million marks for the single convoy.

The glowing trains were explicitly treated as a necessary evil, acting on the assumption that as long as they have to go, it is best to do it competently and earn money for it as well. And, by the way, we gained valuable experience, because similar transports were to go to the USSR from Zarnowiec.

After Chernobyl, the glowing trains suddenly disappeared. That does not mean that there was a shortage of waste. On the contrary, NORD's numerous accidents caused fuel rods to be changed more often than usual, as often as ten to twenty times a year. Transports, surrounded by officers from STASI, left Lubmin at night, reached the border, and there perished in a secret way.

For some time, some of our specialists believed that the DDR had quit using the services of the PKP and that the harmful wastes were wandering to the Soviet Union on sea-going ferries on the newly opened, Mukran-Klaipeda line. In fact, that was what was being done. At least until, thanks to information from American spy satellites, the Swedish Greens made a response. The international uproar surrounding the possible contamination of the Baltic, which would be horrible in its effects, forced the Germans to change their actions.

Top Secret

The administration of the Pomorze DOKP [District Directorate of State Railroads] unequivocally stated that such trains were no longer travelling through its territory. There were no orders from the DDR, and, as the railway workers say, nothing strange may enter the country without their knowledge. At the same time, however, they honestly admit that none of them actually know how to recognize what is in the railcars—especially if, for example, the train is marked as a Soviet military transport, in which case they are not permitted to look into the cars. And there is no lack of transports of this sort. A similar opinion may be heard in the Dolny Slask DOKP.

What else, albeit with difficulty, do the chiefs of the National Atomic Energy Agency say? All that one can get out of them (Director Jan Kubit, Department of

Training and Social Information) is the assurance that the glowing trains are still running. All other questions are blown off with helplessly, out-spread hands and the warning that this is a "top state secret."

The employees of the State Institute of Hygiene remember that not long ago the passage of each transport evoked an entire avalanche of activity. Each time after the announcement from the Main Sanitary Inspectorate, another version of the special safety procedure was worked out. Specialists were on duty all night waiting by their telephones for a possible call. For three or four years, there have been no announcements of the need for transit in a state of elevated readiness.

Railroad employees working along the convoy's old route are afraid to speak. However, there are those who, upon assurance of anonymity, admit that the strange glowing trains are still running, although only every few months, and without escort anymore.

"I saw such a series of cars on a siding in Chojnice," relates one long-time employee of the PKP. "It was easy to recognize because those cold wagons are adapted to hoisting very heavy loads and have six axles each. There are normally no such cars in Poland."

"This train continues to be entered on the schedule of freight connections," says an official of the Pomorze DOKP. "If I remember correctly, I had no authorization to include it in the schedules in 1988 only."

There are more question marks. One other small, experimental nuclear power plant near Rheinsberg has been working in the GDR. This, too, is not too far from the Polish border. The National Atomic Energy Agency, however, is unable to answer any questions connected to this installation. We do not know what the state of the equipment working there is. It can be supposed that it is certainly not better than in Lubmin.

YUGOSLAVIA

Slovenia Wants To Shut Down Krsko Nuclear Plant

AU1107111690 Vienna WIENER ZEITUNG
in German 11 Jul 90 p 3

["T.d.P."-signed report: "Krsko: Slovenia Wants To Switch It Off"]

[Text] Vienna—During the intensive Slovene-Austrian contacts of the past few weeks, Austria's main wish was for the Slovene-Croatian Krsko nuclear power plant, which is close to the border, to be closed down. Following a working meeting with Austrian Economics Minister Schuessel in Vienna, Slovene Energy Minister Dr. Mica Tomšič and Industry and Mining Minister Isidor Rejc held a news conference to outline the future of Slovene economic and environmental policy. According to Energy Minister Tomšič, Slovenia's objective is to further develop sovereignty over the energy sector and to improve efficient energy consumption with a view to saving significant amounts of energy. There is an urgent need to reorganize the whole sector and self-management must come to an end, it was stated.

The Slovenes envisage nationalization as the first step, which is to be replaced by privatization. As Slovenia exports approximately 10 percent of the electricity it produces it can face the closing down of the Krsko nuclear power plant all the more calmly.

If the new Slovene government has its way, a referendum will be held in Slovenia in 1991 to decide this question. So far, it has not been clarified how an agreement is to be achieved with the Republic of Croatia, which rejects the early closing of the plant.

Not only the fear of a possible accident makes the closing down of Krsko likely in the next few years: there is no final deposit for radioactive waste with strong or little radiation. The search for one has already started in Slovenia and Croatia. The early closing down of the Zirovski Vrh uranium mine will mark the start of Slovenia's withdrawal from nuclear power.

To be able to balance the reduced power production, several small thermal power plants and a hydroelectric power plant on the Lower Sava are planned. The Slovenes hope that more than half of the capital needed for the construction of the hydropower plant will be supplied by foreigners—obviously from Austria. However, they fear that the Federal Power Company, which has become rather cautious as a result of the Nagymaros fiasco, might back out.

ARGENTINA

Atucha Plant Operating at 'Full Capacity'

PY1307225490 Buenos Aires TELAM in Spanish
2311 GMT 12 Jul 90

[Text] Buenos Aires, 12 Jul (TELAM)—National Atomic Energy Commission [CNEA] President Manuel Mondino reported this afternoon that the Atucha I nuclear plant began operating at full capacity last night and that it is supplying 367,000 kilowatts to the national interconnected network (SIN).

The official said that Atucha I, which is located near Zarate, and the Embalse nuclear plant in Cordoba are generating 1 million kilowatts, noting that this represents "a major easing of the power crisis."

He stressed that "17 percent of the power that is currently used in Argentina is produced by the two nuclear plants, despite the fact that their installed capacity accounts for only 7.7 percent of Argentina's total installed capacity."

As for the functioning of Atucha I, which began operating on 8 January after a 17-month repair period, Mondino said that "we gradually increased the plant's power over a test period regulated by the appropriate control agency until the plant reached its full capacity."

As for the Embalse plant, Mondino pointed out that it is still generating above its nominal capacity and that it operated at 100.3 percent of its capacity in May.

As an example of the importance of the nuclear plants' energy production, Mondino said that the kilowatts generated by Atucha I and Embalse since they began operating in 1974 and 1983 respectively is equivalent to the power generated by the combustion of 15 million tons of fuel oil. He added that this has permitted currency savings and "prevented pollution of the atmosphere."

He announced that an agreement with the metropolitan city hall "will be signed in the near future" through which the CNEA to hold informational courses for the professors of the district on the peaceful uses of nuclear energy. Mondino also said that the second course on Argentina's nuclear energy and development for local journalists, which will last 10 days, will begin on 10 September.

Deputy Reports Presence of Nuclear Dump

PY1107164190 Buenos Aires TELAM in Spanish
0142 GMT 11 Jul 90

[Text] Resistencia, 10 Jul (TELAM)—Deputy Luis Saadi (PJ [Justicialist Party]-Catamarca Province) has reported the existence of a "nuclear waste dump" in Catamarca Province. He also said that the United Kingdom and the last military government, which admitted its existence, are responsible for this.

Saadi made this statement at Presidencia Roque Saenz Pena, 170 km from Resistencia, which he and his brother, Ramon Saadi, were visiting. During a radio interview, Luis Saadi said the nuclear waste dump is in Antofagasta de la Sierra, on the Galan volcano, or Galan Hill.

Saadi said that in the area "there have been deaths caused by toxic wastes. There are people dying of skin cancer, bone and bone marrow cancer, all of which are characteristic of radioactive areas."

Deputy Saadi said he will submit evidence and documents to congress. He added: "It will be an international blow because our country is being poisoned."

BRAZIL

CNEN Proposes Plan To Finish Angra II, III

90WP0109A Rio de Janeiro O GLOBO in Portuguese
25 Jun 90 p 10

[Reports by Mari-Angela Heredia and Ramona Ordenez]

[Text] Brasilia—Brazil will have a single, unified, nuclear energy program that will integrate the activities of the autonomous program (developed by the Navy) and the official program (result of the agreement with Germany) insofar as possible. This is the proposal backed in a report prepared by several organizations and agencies in the field during the past two months, and soon to be delivered to President Collor by the National Commission for Nuclear Energy (CNEN).

The report also suggests that construction of both Angra II and Angra III be completed by the year 2000. Angra II would be finished in 1996, requiring investments of \$1.2 billion between now and then. Angra III would be ready in the year 2000, after funding of \$1.7 billion. With the conclusion of construction, according to CNEN President Jose Luiz Santana de Carvalho, all the technology covered by the agreement with Germany—now celebrating its 15th birthday—will finally have been passed on to Brazil.

Santana de Carvalho maintains that the two nuclear energy programs are compatible. This official expects that Germany will transfer the technology for the construction of high-capacity power plants and for the jet-nozzle process of uranium enrichment. The autonomous program would be directed toward construction of less powerful reactors, using uranium enriched by the ultracentrifuge method. One of the agreements signed with Germany on the subject of uranium enrichment expires next year, but there is still a lot of technology to be transferred. "That technology has not been passed on yet because of international pressure, primarily from the Americans. Germany justifies this by saying there are no qualified technicians in Brazil, but that is not the whole truth," insisted the CNEN president.

Santana de Carvalho says that there is now effective civilian control over the entire nuclear field and that authority to approve all projects in the sector is concentrated in civilian hands. Two weeks ago the CNEN president attended a meeting of the International Atomic Energy Agency (IAEA) in Vienna, where he described the new posture of the Brazilian government towards nuclear energy: transparency, control over all programs, and a dialogue with society. "The representatives of the IAEA member nations were satisfied with the Brazilian posture," he concluded.

Now that publications such as *FORBES* (an American business and variety magazine) indicate that the "greenest" [as published] way of obtaining electricity is by means of nuclear methods, Santana firmly believes that the market is going to heat up and that Brazil will have an opportunity to participate in it because Brazil, among all the countries that produce such energy, now stands on the threshold of independence. "The Swedish and Italian nuclear programs have been canceled by their parliaments, and the programs of countries that also possess this technology—such as the United States, France, England, and Canada—are not moving ahead. Five years from now, when supplies are tight during the 'interval between nuclear harvests,' Brazil and Germany might be able to occupy the market. With cheap labor and tropicalized technology, Brazil will certainly be at the forefront in Latin America and would be able to supply equipment and products," he concluded.

Nuclear Pact Reaches 15 Without Generating Any Energy

It will be 15 years old on Wednesday, but there's no reason to celebrate. Instead, it's undergoing yet another change in course. It was 15 years ago that the Brazilian and German governments signed a nuclear agreement calling for the transfer of technology and the construction of eight nuclear power plants, as well as the complete atomic fuel cycle.

After all this time, the country has now spent \$7 billion under this pact and is losing \$1 million per day without having produced a single "nuclear" kilowatt or enriched 1 gram of uranium. It will be four years before Angra II, the first of the eight power plants under the agreement—the one that was supposed to start operating in 1980—will be ready, if funds are available. (The plant that is operating, Angra I, is not covered by the pact.)

Today, the future course of the nuclear agreement is undergoing another review (the last one was in 1988) coordinated by the Strategic Affairs Secretariat (SAE). That body is comprised of military officers, plus technical personnel from the Secretariats of the Environment and Science and Technology and from the CNEN. The results of this review will be announced sometime in the next several weeks.

But why did the nuclear agreement fail? Because during the 1980's Brazil did not grow at the spectacular 10

percent rate forecast by the government. On the contrary, it sank into a deep crisis that left it with no means of paying for the huge programs that had been planned during the "economic miracle" years.

It took a long time for the various Brazilian governments to adapt the plan to reality. For example, Nuclebras Heavy Equipment Corporation (Nuclep), which ranks among the biggest and most modern industrial firms in the world and has the capability to manufacture one full set of large-scale parts for nuclear power plants per year, is at a standstill, after having cost \$350 million. The government believes the solution is to privatize it. More than \$400 million was spent on construction of the uranium enrichment demonstration plant employing the jet-nozzle method, but not a single gram of the product has been enriched. The Angra II plant, in turn, has already consumed \$1 billion.

Former president of Brazilian Nuclear Industries (INB) John Albuquerque Forman, who was present at the signing of the agreement, emphasized that the figures for the program are as high as they are because of construction delays. But he admitted that there was an excessive dose of optimism.

"Plans developed in that decade counted on a high demand for electricity. Besides, energy consumption was rising at an average rate of 10 percent per year. So when Eletrobras developed its Plan 90, it forecast an energy deficit of 10,000 megawatts for the decade of the 1980's, a gap to be filled by building eight power plants. Of the \$7 billion spent on the nuclear program so far, \$3.2 billion was spent on building the nuclear power plant and on the fuel cycle. Construction delays in the nuclear program projects doubled their costs, so that now they total \$6.5 to \$7 billion," said Forman.

In Forman's view, costs jumped so high because the Brazilian government failed to do its part, i.e., did not appropriate the cruzeiro funds called for under the agreement. Meanwhile, the German banks were fulfilling their part of the bargain. Last year Brazil paid out \$365 million in interest, but did not invest the \$260 million equivalent in cruzeiros that should have been spent on Angra II and III construction.

The problems began, according to Forman, when a debate arose about the foundation under Angra II. The discussions led to a lengthy delay and boosted the cost. Early in the 1980's, after the country had experienced two petroleum "shocks," (in 1979 and 1981) the interest rate crisis occurred and Brazil, like Mexico, went bankrupt.

According to Forman, a comprehensive reformulation was carried out during the consolidation. The model was modified, and a decision was reached to finish Angra II and III. Once again, however, the funds never materialized. Forman stresses that both plants must be completed because none of the hydroelectric projects is able to generate the volume of energy that these two can generate—1,300 megawatts each, and at a lower cost in

comparison to the funds still needed to finish the two plants—\$1.1 billion for Angra II, and \$1.5 billion for Angra III.

Since the agreement provides for the transfer of technology along with the construction of four power plants, if Brazil completes only the first two, not only will it not acquire the knowhow to build future power plants by itself, but it will—says Forman—have to indemnify Germany for breach of contract.

Forman explained that in recent years, the government's practice has been to allocate small amounts of funds to countless different areas, without setting priorities. Thus all of them—nuclear energy, petroleum, and electricity—find themselves in a tough position.

Fonseca Justifies Secrecy Surrounding Program

90WP0105C Sao Paulo O ESTADO DE SAO PAULO in Portuguese 22 Jun 90 p 12

[Article by Rubens Santos: "Former Minister Defends Nuclear Program"]

[Text] Brasilia—The manufacture of a Brazilian atomic bomb was never included in any project, nor was it ever a part of the military objectives linked to Brazil's independent nuclear program. These assurances were given yesterday by Maximiniano da Fonseca in testimony before the Joint Committee of Congressional Inquiry [CPI], which is investigating in the National Congress the Brazilian parallel program. The admiral justified the secrecy as a measure imposed by the concerned military and civilian officials to lessen the external pressures, mainly from the United States. "Had the program been overt, we would never have achieved the level of 20 percent in the enrichment of uranium last year by the method of ultracentrifugation," he said. According to the former minister, the Americans "brought—and to this day are bringing—tremendous pressures to bear in an effort to disrupt whatever they can."

Maximiniano explained that these pressures began in the 1950's, when Admiral Alvaro Alberto, the then chairman of the National Commission for Nuclear Energy (CNEN), "fought unsuccessfully" to carry out a Brazilian nuclear program. This led to the admiral's dismissal from the CNEN, and as a result, according to the former minister, "Brazil was set back approximately 30 years in this field."

The CPI invited Maximiano da Fonseca to testify concerning the creation of the independent program—known as the parallel program—that was initiated in 1979 with an investment of 5 million cruzeiros, made available at that time by the National Security Council (CSN). He disclosed that the program was intended—in addition to bypassing the external pressures—to acquire technological expertise in the fuel cycle sector. "In addition to the technology to be achieved, it was essential not to endanger the agreement with Germany, which at that time was important for our country," he said.

Cachimbo

Maximiano—who was unable to explain to the CPI's parliamentary reporter, Senator Severo Gomes (PMDB-SP) [Brazilian Democratic Movement Party-Sao Paulo] the reason for the existence of a number of deep wells in the Serra do Cachimbo—stated that the program does not envision the manufacture of the atomic bomb. "We could in fact make it without any difficulty," he declared, "but that would be stupid. It would be a decision out of keeping in a country that is not even threatened by any wars." The holes, 220 meters in depth, were made by underground explosions. The accusation—which was made by the Brazilian Physics Association—provoked laughter from the former minister. "Making a bomb is no mystery, but that was not our intention," he said. "Moreover, the National Institute of Industrial Property (INPI) would not agree to register a project of that type, because it is already known to the world and any student of physics can make one," he said sarcastically.

Santo Amaro Monazite Plant Remains Closed

90WP0105B Sao Paulo O ESTADO DE SAO PAULO in Portuguese 16 Jun 90 p 11

[Text] Rio de Janeiro—The Santo Amaro Monazite Sands Processing Plant (USAM) in the state of Sao Paulo, belonging to the NUCLEMON [NUCLEBRAS Monazite and Associated Elements, Ltd.] state enterprise, was closed by the National Commission for Nuclear Energy (CNEN) one month ago for not providing safe conditions for its employees or for the environment. The closure was scheduled to last only three days—a time frame regarded by the CNEN as sufficient to enable the NUCLEMON management to comply with the commission's requirements. Anselmo Paschoa, acting chairman of the CNEN, announced yesterday that USAM can resume operations next week if all its instructions have been followed.

Paulo Miranda, manager-superintendent of NUCLEMON, disclosed that USAM does \$1.2 million worth of business per month, of which 45 percent derives from the processing of monazitic sands, the production of which is at a complete standstill. Miranda admitted that he has still not followed some of the CNEN's instructions, such as purchasing radiation-protection equipment abroad, but did not explain the reasons why. He also chose not to disclose the losses sustained by NUCLEMON because of the 30-day shutdown of the plant. "I do not want to go into these aspects," he said. "Today we urgently need one thing: that USAM go into operation."

Equipment

Miranda says that NUCLEMON already has 20 gas masks for the employees who work every day in the production area. This equipment is essential, because radioactive elements such as thorium and uranium are

extracted from the monazitic sands. The manager disclosed that NUCLEMON has also constructed a special area where the workers can change their clothes. He said that 600 of the 650 employees work in production areas. The CNEN also required that USAM have special dumps for contaminated waste. "We are following the instructions," Miranda commented, "but we cannot do everything instantly."

Military Projects Proposed for Nuclear Program

PY1107215690 *Sao Paulo FOLHA DE SAO PAULO*
in Portuguese 4 Jul 90 p 4

[Report by Regina Eleuterio]

[Text] Rio de Janeiro—The work group in charge of reviewing the Brazilian nuclear program will propose to President Collor the investment of approximately \$2 billion (172 billion cruzeiros on the parallel market) in military projects and privatization of several activities in the nuclear sector. The proposals include a preliminary report that foresees the conclusion of Angra 2 in 1996 (according to Brazilian Nuclear Industries plans, it could be concluded by 1994), and Angra 3 in the year 2000.

Civilian associations in the energy and scientific areas see the proposals as a sign that the government will give priority to the parallel program developed by the Armed Forces—to the detriment of civilian projects. The final report will have approximately 100 pages slightly different from the preliminary reports. The work group will meet tomorrow in Brasilia to prepare the final report to be handed over to President Collor.

This group, organized in March, is made up of representatives of the Armed Forces, the Environment and Science and Technology Secretariats, the Infrastructure and Foreign Ministries, and the National Nuclear Energy Commission (CNEN) president, Jose Luiz Santana de Carvalho.

The report, which outlines the nuclear program up to at least the year 2000, suggests that the production of uranium concentrate be given to private companies, which will be charged with research, mining, and operation of the enterprise. For this, they will receive, free of charge, geological and technological information that is in the hands of the Brazilian Nuclear Industries (INB). Joao Manoel Barbosa, 41, of the Economists Union and the Association of INB employees, has stated that the Constitution establishes that the exploitation of nuclear services of any nature must be exclusively in the hands of the state.

The report proposes abolishment of the Uranium of Brazil enterprise, an INB subsidiary in charge of mining uranium ore, its production, and enrichment, and of the Separation Factors Factory (FES) [Fabrica de Elementos de Separacao], which specializes in manufacturing elements for uranium enrichment. Nuclemon [Nuclebras Monazite and Associated Elements, Ltd.], which is in charge of mining and enriching monazite elements, is among those to be privatized.

During the presidential campaign, Collor said his government program foresees the conclusion of Angra 2 and revision of the agreement for construction of Angra 3. The work group is keeping the two, but has postponed the INB schedule (Angra 2 in 1994 and Angra 3 in 1997). The group foresees the creation of specific managements within Furnas Electric Power Plants, Inc. to administer the two plants.

As for the \$2-billion investment in military programs, this includes resources for reactors to be built by the Army and Air Force. The Army project foresees a graphite nuclear reactor, which is used in other countries to manufacture the atomic bomb.

Country Positioned To Obtain Bomb Elements

PY1107231090 *Sao Paulo FOLHA DE SAO PAULO*
in Portuguese 7 Jul 90 p A 6

[Report by Jose Coronado]

[Text] Brazil is already in the position of obtaining the necessary elements to manufacture a nuclear bomb. This statement was made by Jose Goldemberg, science and technology federal secretary, during recording of the "Economic Moment" program presented by journalist Salomao Schwartzman, of Rio de Janeiro Manchete Television. This program will be aired within the next few days, although no date has been set yet. Goldemberg admitted that the Armed Forces plan to install a plant for the treatment of enriched plutonium, a substance that can be used in manufacturing nuclear bombs.

Schwartzman asked Goldemberg whether Brazil has gone "into labor" prior to giving birth to an atomic bomb. Goldemberg answered that the country is in a position to produce nuclear weapons, but that it will attempt to use the resources for peaceful means—the generation of energy and the production of nuclear submarines. He added that a commission made up of several ministries, including the Army, was created at the beginning of the Collor government to study the Brazilian nuclear model. This commission has submitted several recommendations to President Collor, among them the installation of a plant for the treatment of enriched plutonium.

Goldemberg said that there are always military groups interested in the production of nuclear weapons. He added that one of the commission's recommendations was that the plutonium be used for peaceful means. Goldemberg said that personally he opposes the use of nuclear energy for military purposes.

Nuclear Program To Pass to Civilian Control

PY1207212390 *Rio de Janeiro O GLOBO* in Portuguese
9 Jul 90 p 11

[Report by Fanny Zygband]

[Text] Porto Alegre—The Brazilian Nuclear Program will be placed under civilian supervision and control for

the first time since its creation. This announcement was made yesterday by Science and Technology Secretary Jose Goldemberg during the opening of the 42d annual meeting of the Brazilian Society for the Advancement of Science (SBPC). Goldemberg explained that the measure was approved last week by the group that was created by the government to study and define the country's nuclear policy. The measure is being prepared by the group and it will be submitted in two weeks for evaluation by President Fernando Collor de Mello.

Goldemberg indicated that, according to the proposal made by the group, the Nuclear Security Supervisory Committee will be made up of seven members of which three will be civilians. The members will be appointed by the president for a four-year term, and their appointments must be approved by Congress.

Goldemberg said that the proposal answers an old demand by the scientific community to put an end to the speculation and apprehension over the possibility that Brazil may be secretly developing a nuclear bomb.

Goldemberg also took advantage of the 42d SBPC meeting, which is the most important scientific meeting in the country, to evaluate the first 100 days of the Collor administration in the area of science and technology. He said that during this period of just over three months it was possible to improve the economic situation of the research institutes and to increase their budgets by 10 percent. He said that his organization is directly involved in four important issues: the Amazon occupation policy, industrial reform, the energy policy, and the development of the northeast.

He added that the redistribution of military activities in Calha Norte and in the Amazon and the decision for the future occupation of the Amazon, which will be preceded by a plan to redistribute the economic and environmental zones, are important gains for the country.

Goldemberg defended the new industrial policy announced by Collor and the end of the protected market for the computer industry. He added that although national industry has been protected for the past 40 years it has not been able to adjust to the demands of today's world.

FRG Seeks To Change Focus of Nuclear Pact

*PY1407145290 Rio de Janeiro O GLOBO in Portuguese
13 Jul 90 p 16*

[Report by Fanny Zigband]

[Text] Porto Alegre—The FRG is seeking to renegotiate its nuclear agreement with Brazil, offering technology and training in the area of reactor and plant safety, and monitoring of environmental radioactivity.

This statement was made yesterday by Horst Dieter Talarek [name as published], coordinator of the Brazilian-FRG Bilateral Cooperation Program and head of the International Office of the Julich Research Center (KLA) of the FRG Ministry of Science and Technology.

According to Talarek, who came to Brazil at the invitation of the Brazilian Society for the Advancement of Science (SBPC), two months ago the FRG formally submitted—through a protocol of intent—a proposal to this end to the chairman of the National Nuclear Energy Commission (CNEN).

Talarek said that German physicists linked to the FRG Government have made a detailed evaluation of the status of the Brazilian-FRG nuclear agreement and of Brazilian needs in this area. In their conclusions, they state that technology relating to the safety and monitoring of nuclear installations would be the best way of reactivating nuclear cooperation between the two countries, a cooperation that had been slow since Brazil developed its Parallel Nuclear Program and was suspended when President Fernando Collor was inaugurated.

In the protocol sent to the CNEN, the FRG Government proposed that joint projects be implemented at the KFK [expansion unknown]—the FRG nuclear research center in Karlsruhe where Brazilian physicists were trained in the late 1970's—and at the Center for Nuclear Technology Development in Belo Horizonte.

In his opinion, the main objective of this program would be to study flaws in reactor systems and set up mathematical models and computer programs capable of predicting nuclear accidents. Talarek refrained from criticizing the way nuclear activities are being conducted in Brazil, but noted that not having these technological resources would mean facing higher risks.

Talarek added that the proposal also includes FRG aid to choose sites and build deposits for radioactive waste.

Talks With Argentina on Modifying Tlatelolco

*90WP0116D Rio de Janeiro O GLOBO in Portuguese
7 Jul 90 p 6*

[Text] Buenos Aires—Brazil and Argentina will propose that industrial secrecy in the nuclear field be protected for the countries that signed the Treaty of Tlatelolco. This treaty, formulated in Mexico during 1987, is the one controlling nuclear development in Latin America. Brazil signed and ratified the treaty, but with one reservation: In the case of Brazil it would only go into effect after all the countries of the area had ratified it. Argentina merely signed it. The suspicion of both countries is that Tlatelolco may allow the breaking of industrial secrecy.

Foreign Minister Rezek remarked: "It is a justified and legitimate misgiving. The treaty, as it stands, represents a risk to industrial secrecy."

The solution found by the two governments, which were previously competing in the nuclear field, is this new clause to preserve industrial secrecy.

The Argentine foreign minister, Domingo Cavallo, commented: "It would be a method to ensure peaceful use of nuclear energy and, at the same time, to preserve industrial secrecy within Tlatelolco."

Brazil and Argentina think that they are currently experiencing a different era in their nuclear relationship. The two governments believe that mutual trust has been heightened, and exchanges of secrets have increased. So much so that, yesterday, they signed another document intensifying relations in the sector: a common list of products for construction of the Angra II plant in Brazil and the Atucha II plant in Argentina.

The exchange of products is subject to the approval of programs by business firms, which will have to be qualified by the nuclear power plants as their suppliers. The two countries have already exchanged lists of products that they would be able to provide, and have laid the groundwork for the mutual inspection of products and qualification of suppliers.

Now, in addition to the exchange of products, there is a joint proposal to change one of the clauses of the Treaty of Tlatelolco. What neither Brazil nor Argentina has agreed to sign is the Nuclear Non-Proliferation Treaty (NPT), because they consider it restrictive to nuclear development.

"It is a backward, prejudicial text," criticized Rezek, putting an end to the possibility of Brazil's signing the NPT.

Committee Assesses Future Angra Costs

90WP0116C Sao Paulo O ESTADO DE SAO PAULO
(economic section) in Portuguese 11 Jul 90 p 5

[Text] Brasilia—The country has already spent \$8.38 billion on the Brazilian Nuclear Program, 35.8 percent of which (\$3 billion) was for financial costs alone. The increase in financial costs, which has not produced a return, was a result of the lack of budgets with definite construction programs and reliable disbursement timetables. This is one of the conclusions drawn by the task force assigned to study the status of nuclear activities in Brazil.

The document prepared by the group shows that the Brazilian Nuclear Program will spend another \$7.01 billion to complete the works projects that are under way. Another conclusion drawn by the group is that the country's nuclear development will depend on cooperation between the executive and legislative branches, and on the "enlightened" support of the public. "The public's resistance is due to the almost nonexistent mediation between the government's nuclear agencies and the

society, as well as the insufficient disclosure to the public of the controls, risks, and benefits of their activities," as the document states.

The group admits that the risks of further accidents such as the one that occurred in Goiania are real, "because of the inadequate control of the sources, particularly those for medical and research use." Therefore, it recommends that the operating condition of the equipment be systematically checked, and that facilities and authority be created in the states' structure for a decentralized inspection, with the supervision and supplementary action of the National Commission for Nuclear Energy (CNEN) and the Health Ministry.

In its evaluation of the plants, the group felt that the Furnas' position of holding responsible the manufacturer of the Angra I steam generators, which will have to be replaced by the end of the decade, was appropriate. With regard to the Angra II plant, considered a "priority undertaking," the study shows that, as of April of this year, \$1.61 billion had been spent; the total investment required for the completion of the project is \$1.59 billion.

CNEN Abandons Itataia Uranium Deposit

90WP0116B Sao Paulo O ESTADO DE SAO PAULO
in Portuguese 7 Jul 90 p 10

[Text] Fortaleza—The Itataia deposit, considered the largest uranium deposit in Latin America, and the fifth ranking in the world, located in the municipality of Santa Quiteria, 155 km from Fortaleza, has been virtually abandoned by the authorities. Assessed at nearly \$3 billion, and containing 142,000 tons of uranium, the Itataia deposit is receiving protection from only four guards. Besides its physical deterioration (collapsing walls, and with a large accumulation of dirt inside it), Itataia is not receiving scientific and technical supervision of the work done by the Brazilian Uranium enterprise.

According to technicians from the National Commission for Nuclear Energy (CNEN), the preoperational environmental monitoring program developed to provide anti-polluting conditions in mining activities on an industrial scale was interrupted at Itataia in October of last year, for lack of funds. Hence, CNEN has decided to ignore it, in view of the advancement in the levels of radioactivity recorded in the region's rivers, fauna, and flora.

The CNEN chairman, Jose Luiz de Santana Carvalho, abolished the regional district of the agency that was operating over an area of 576 square km around the mine; and the 32 civil servants who had been working on the site were given reserve status. Based on the assessment made by these technicians, the Itataia deposit would have been equipped to guarantee a billing of \$100 million each year during the next two decades, with an annual production of 800 tons of uranium and phosphate. In addition to these products, the vast limestone

reserve existing in the region could be used in agriculture (as a soil corrective) and in the manufacture of lime and cement.

According to Francisco Pessoa, spokesman for the civil servants from the defunct CNEN district of Fortaleza, the cuts in the commission's technical staff constitute "an affront to the country's scientific community." He claims that the uranium from Itaitaia would be sufficient to feed 10 reactors of plants the size of Angra II for all of their useful life. "This means that the energy problem of the entire Northeast region would have been virtually solved."

Study Warns of Near Capability To Make Bomb

90SM0197A Sao Paulo JORNAL DA TARDE
in Portuguese 3 Jul 90 p unknown

[First paragraph is JORNAL DA TARDE introduction]

[Text] Scientists from the Brazilian Physics Society warn that if the military nuclear programs are not rigorously supervised, Brazil may soon have the atomic bomb.

Physicists from the Committee for Monitoring the Nuclear Issue, which is an agency of the Brazilian Physics Association (SBF), issued a warning in Rio de Janeiro yesterday, saying that Congress urgently needs to make preparations for supervising the Armed Forces nuclear programs. The physicists feel that if there is not strict supervision, Brazil may develop the atomic bomb within a very short time. At the Navy's Aramar Experimental Center in Ipero near Sorocaba (Sao Paulo), uranium (the fuel for nuclear reactors and atomic weapons) is being enriched to over 20 percent, and this worries the physicists, since the Aramar plant is part of the (military) parallel nuclear program and is not under the supervision of civilian society and the International Atomic Energy Agency (IAEA), whose headquarters are in Vienna, Austria.

According to an SBF report sent to the speaker of Congress, Senator Nelson Carneiro, a month ago, about 3,000 centrifuges (machines capable of enriching uranium) would enable the Navy at the very least to produce about 20 kg of uranium enriched to an estimated 90 percent (enough to produce a bomb). A report published in the JORNAL DA TARDE yesterday [2 July] revealed that the Aramar Experimental Center currently operates 999 centrifuges and is expanding its nuclear research facilities so as to produce enriched uranium on a large scale. The SBF's physicists also issued another warning, saying that with 150 kg of uranium enriched to 20 percent, the Aramar Experimental Center would be able to obtain 20 kg of 90-percent uranium within a week.

Technical Supervision

Physicists Luiz Pinguelli Rosa, Odair Dias Goncalves, and Fernando Souza Barros of the SBF are issuing those warnings and pointing out that so far, they have not been invited to participate in a broad debate concerning the

report they submitted to Congress. The document shows that Brazil is reaching the point where it will be able to produce the atomic bomb.

"We want technical supervision of the nuclear programs, not just courtesy visits to a few units such as Aramar where all we do is drink coffee," commented Souza Barros. According to him, the SBF is not opposed to the progress of technology, but it advocates the supervision of all projects in that field both within the parallel nuclear program and outside of it.

Pinguelli Rosa says that the independent scientific community is waiting to see what is going to happen to the Brazilian nuclear program and "whether the emphasis will be on the parallel program, where the Navy is obviously the leader." Another concern of the SBF's physicists has to do with the report that the task force set up by the Secretariat for Strategic Affairs in Brasilia has recommended a \$2-billion budget for the parallel nuclear program so it can build eight reactors for the Navy, the Army, the Air Force, and the National Nuclear Energy Commission.

No Comment

In Brasilia, the military ministers chose not to comment on the JORNAL DA TARDE's report. "Any information on that subject must come from the Secretariat for Strategic Affairs," according to the Information Office in the Ministry of the Army. The response was the same at the Ministry of Aeronautics. As of 1900 hours, Secretary Pedro Paulo Leoni Ramos had not commented on the matter, nor had the Secretariat for Strategic Affairs issued any official communique on the subject.

Control of Aramar Nuclear Activities Urged

90SM0197B Sao Paulo JORNAL DA TARDE
in Portuguese 2 Jul 90 p unknown

[Article by Valdir Sanches; first paragraph is JORNAL DA TARDE introduction]

[Text] The Aramar Experimental Center in the municipality of Ipero is the source of rumors which are worrying the scientific community. It is there that the Navy is expanding its nuclear research facilities in order to produce enriched uranium on a large scale. That uranium can be used to drive reactors and nuclear-powered submarines or to secure the country's admittance to the exclusive nuclear club.

Brazil, which taught itself how to enrich uranium—that being the trick necessary for mastering the nuclear fuel cycle—is now preparing rapidly to produce enriched uranium on a large scale. For better or for worse: for supplying research reactors and propelling a nuclear-powered submarine, which is the official story, or for producing the atomic bomb—as is strongly suspected by interested sectors in the national scientific community, one example being the Brazilian Physics Association [SBF]. "We could produce the atomic bomb without any

difficulty," Maximiano da Fonseca, minister of the Navy in the Figueiredo administration, admitted as he testified before a CPI [Congressional Investigating Committee] last week and denied any intention of producing one.

The fact is that the Navy is in a major expansion phase at its Aramar Experimental Center in the municipality of Ipero in the interior of Sao Paulo. That center is the main base for the parallel nuclear program, which was set up 11 years ago, succeeded in enriching uranium eight years ago, and reached an important milestone two years ago: that of enriching uranium to 20 percent. With uranium enriched to three percent, it is possible to run nuclear power plants such as Angra-1. Uranium enriched to less than 20 percent can operate research reactors. If enriched to 20 percent, it can propel nuclear-powered submarines. And at 93 percent, it can explode an atomic bomb.

Using the existing pilot plant in Aramar, it would be possible in principle to enrich uranium to 93 percent. But it would not be feasible in practice because the process would take many, many years. The crucial factor is the number of centrifuges—high-precision machines in which uranium is enriched in a cascade system (meaning that it passes from one machine to another until the desired enrichment level is attained). To reach a high level such as 93 percent or to obtain large quantities enriched to 20 percent, thousands of centrifuges are needed. That is why Aramar is preparing rapidly.

Report

What exists there today is a pilot plant consisting of two units: MC-2, which covers 1,500 square meters and has 90 centrifuges, and M-0 (M-Zero), which covers 3,000 square meters and has 900 centrifuges. But over the past two years, three large buildings known as M-1, M-2, and M-3 have been erected. Those three structures almost completely fill a 24,000-square-meter plateau. A simple calculation enables one to conclude that if M-0's 3,000 square meters contain 900 centrifuges, an area of over 20,000 square meters will hold more than 6,000 centrifuges. That is enough to enrich uranium to 93 percent.

"Provided that one has enriched uranium, the device (the atomic bomb) can be built and tested easily in less than one year and with complete confidence and safety." That is one of the disturbing points brought out in a report sent to Congress by the SBF a little over a month ago. In that report, the SBF drew attention to Aramar's activities and asked that Congress establish "a national system of safeguards to prevent the possible diversion of those materials for the production of nuclear bombs." One passage in the report, which was obtained by reporter Tania Malheiros of the ESTADO Agency, warns: "The issue considered crucial at the moment is that of control over the enrichment of uranium so as to prevent the production of raw material for a nuclear-fission bomb."

Borehole of the Right Size

The report mentions the borehole discovered a few years ago by the press at the Air Force base in the Cachimbo Mountains in Para. Its size—one meter wide and 335 meters deep—is "consistent" with that of the kind of borehole needed to test "a nuclear device of low technical efficiency but with explosive power similar to that used over Hiroshima." The bomb, which uses 18 kg of uranium enriched to 93 percent, would be cheap: "The cost, with enriched uranium available and with the borehole already drilled, is cheap. Practically the only thing left would be the salaries for half a dozen technicians. At a rough estimate, the total would not exceed \$2 million."

Physicist Ennio Candotti, chairman of the SBPC (Brazilian Society for the Advancement of Science), now complains: "Our persistent requests for clarification concerning the borehole in Cachimbo have never been answered." Last week he and his colleague Luiz Pinguelli Rosa of the SBF submitted a new report to Congress with the same warnings about signs that Brazil might moving toward the production of an atomic bomb. This second report states that the task force set up by the Secretariat for Strategic Affairs to analyze the direction being taken by the Brazilian nuclear program has concluded that the government should build nine nuclear reactors over the next few years. Of that total, three would be for the Navy, one for the Army, and one for the Air Force. "Those reactors have no purpose except that of serving the internal interests of the three services," says Candotti. "There is no scientific justification for them; they will serve simply to strengthen each of the services."

Candotti's concerns, which are also expressed in the SBF's report, cover other pertinent points. Brazil has not signed, nor is it showing the slightest intention of signing, the Treaty on the Non-Proliferation of Nuclear Weapons, under which several nations pledge themselves to the peaceful use of nuclear energy. The Angra-1 power plant and equipment resulting from the cooperation agreement signed with the FRG in 1975 are inspected by the International Atomic Energy Agency. But the parallel nuclear program under way at Aramar (which was pursued secretly for nine years before being discovered by the press two years ago) is not subject to supervision of any kind. And what the scientists want is precisely that: they want Congress to hire qualified personnel and begin supervising the parallel nuclear program—since the Constitution permits the use of nuclear energy only for peaceful purposes. A recently established joint congressional investigating committee has begun hearing testimony from such people as former Minister Maximiano da Fonseca. He explained that the secrecy of the parallel program was in response to external pressure, chiefly from the United States, "which is trying to mess up everything it can." But he could not explain the existence of the borehole in Cachimbo.

Another concern of the physicists is the fact that under the Collor administration, the CNEN (National Nuclear

Energy Commission)—the sponsor of the parallel nuclear program—has been transferred from the National Security Council to the Secretariat for Strategic Affairs in the Office of the Presidency. "The military-strategic character of control over nuclear energy is being retained," say the physicists. If that were not the case, the CNEN ought to come under the Secretariat of Energy or the Secretariat of Technology in the Ministry of Infrastructure.

In any case, the Aramar Experimental Center is remaining very active on its 300 hectares in the locality known as Fazenda Ipanema (which outsiders are not allowed to enter) in the small municipality of Ipero near Sorocaba, 120 kilometers from Sao Paulo. Its centrifuges are completely Brazilian-made and are built at Aramar itself by one of the plants there: the Mechanical Components Factory (Facom). Many parts are supplied by industry, especially by firms in Sao Paulo—which, during the time that the activities in Aramar were a secret, did not know what the parts and electronic components ordered with precise specifications would be used for. But Facom is increasing its own capacity: first it bought a computerized high-precision lathe, and now it has bought another—an Italian CNC-brand lathe—that is accurate to 1/100th of a millimeter.

Phases of Project

An expert connected with Aramar, engineer Gilberto Gomes de Andrade of the IPEN (Institute for Nuclear and Energy Research)—where the first prototype machines were developed and the pilot enrichment of uranium was carried out—explains the need for so many centrifuges: "They will provide a level of production consistent with the needs of the Aramar site beginning now." How many centrifuges will meet those needs "is secret information." "But there are enough to support the program," with "later phases" already being anticipated.

One of those phases will be the construction of Renape-1, a pressurized water power reactor like Angra-1. Plus the facilities for manufacturing its first core—the charge—and the reloads. At the moment, the project is in the earthwork stage (with much activity by the construction equipment even on holidays). The Renape project ("Renape" stands for "National Power Reactors") goes farther than just the construction of a reactor. "Together with the CNEN, Aramar wants to develop those reactors. They want to establish the industrial structure for manufacturing the entire reactor," says a well-placed source.

Engineer Andrade says that the uranium enriched to 20 percent at Aramar will also be used to increase the IPEN's research capacity by raising it first from the current two megawatts to five megawatts and then to 10 megawatts. "And it will also support other research reactors in the country." Another large section of the Aramar site—where earthwork is also under way—will be the site of the fuel cycle facilities, "with a few demonstration plants for converting the uranium into

UF₆, or uranium hexafluoride. UF₆ is uranium in the form of gas, the state in which it is sent to the centrifuges for enrichment.

The least innocent visible product of the entire program is, however, the reactor for the nuclear-powered submarine that the Navy wants to build perhaps in the year 2000. A submarine that only has nuclear propulsion is not a weapon, say the defenders of the project in response to the scientists, who consider a nuclear-powered submarine to be itself a weapon of war.

'Foolish' Technology

The possibility that in addition to the other projects (or with them as a pretext), the enriched uranium in Aramar may be used to produce an atomic bomb does not impress Andrade: "There is always that specter of the bomb. The first bomb to be exploded anywhere in the world was detonated almost 45 years ago (a test by the Americans on the Bikini Atoll in 1946 during World War II [as published]). It would be inadmissible for Brazil not to master a technology that is 50 years old." The decision to produce the bomb, therefore, "is political, not technological." Reiterating what the people involved in Aramar (and former Minister Maximiano himself) have been saying, Andrade argues that "it is not reasonable to use the bomb as a pretext for limiting the country's technological development."

Statements like that sadden physicist Ennio Candotti, who considers nuclear technology "old and foolish, from the 1950's." "Nowadays, the intelligent thing is to invest in areas such as electronics—optical memory for data processing, for example. Defense today means technological mastery—it means facing up to the challenges in high-tech areas."

Convinced that "the military have not given up on the bomb," Candotti considers nuclear development for that purpose "thoroughly unethical." "And if the intention is development for peaceful purposes, there is no reason for the program to be under the control of military institutes. It is as though Eletrobras [Brazilian Electric Power Company, Inc.] were to suddenly start producing guns."

Brazil Has Its Own Technology

Brazil is paying interest of \$1 million per day for the Angra-2 and Angra-3 power plants—with the former being in an interminable construction phase and the latter not even started. The cost of each of those plants stands at around \$3 billion. In Angra-2's case, nearly \$2 billion of that \$3 billion have already been spent. And Angra-1, which began operating in 1983, has had serious problems. It has never operated satisfactorily.

But an even worse feature of the deal made with the FRG—the cooperation agreement signed in 1975 for construction of the plants—concerns the enrichment of uranium. "We wanted to acquire the entire fuel cycle, and the FRG agreed. But because of the safeguards

imposed by the United States, it eventually reneged on its intention to transfer the ultracentrifugation process for enriching uranium to us," says nuclear engineer David Simon, former director of Nuclebras [Brazilian Nuclear Corporations, Inc.] (the state-owned enterprise responsible for that program). He is regarded as the "father of Angra-1."

Ultracentrifugation is the process which the parallel nuclear program (the autonomous program established in 1979) later wound up developing on its own with no transfer of foreign technology and which resulted in the profusion of centrifuges at the Aramar Experimental Center. Under the partnership established with the FRG in 1975, Brazil wound up with the so-called jet nozzle process for uranium enrichment—a process whose effectiveness had not yet been proven (but for which a plant was nevertheless built in Resende, Rio de Janeiro). "It was a total fiasco. It was an expensive and difficult process and one without a future," says Simon.

Uranium Enrichment in Cascade

Why is it necessary to enrich uranium? In the form in which it exists in nature (Brazil has the world's fifth-largest reserve, estimated at 500,000 metric tons), uranium consists of isotope 238 (99.3 percent), which is fertile, and isotope 235 (only 0.7 percent), which is fissionable—that is, it is suitable for nuclear fission. And that is why it is the fissionable isotope which is of interest from the standpoint of power plants and nuclear devices. Fission occurs when neutrons bombard the nucleus of a uranium atom, causing it to split. That releases the energy which drives a plant's reactor or causes a bomb to explode.

To increase the percentage of fissionable material (the enrichment process), the uranium is converted into gas (UF_6 , or uranium hexafluoride) and sent to the centrifuges in that state. Rotating at extremely high speed, the centrifuges separate the two isotopes, with the result being higher quantities of—fissionable—isotope 235. Separately, the centrifuges have only a small enrichment capacity. Because of that, they are interconnected and work as a "cascade." Enrichment may stop when the fissionable isotope rises from the original 0.7 percent to 3 percent. That percentage is high enough to operate a nuclear power plant. If the process continues until the uranium is enriched to 20 percent, the result is fuel for a

nuclear-powered submarine. And if it continues even further—to 90 percent—the result is the bomb.

Committee Proposes Uranium Reprocessing Plant

90WP0116A Sao Paulo O ESTADO DE SAO PAULO
in Portuguese 6 Jul 90 p 10

[Text] Rio—Brazil may construct a pilot plant for reprocessing uranium and obtain plutonium on a laboratory scale, at an initial cost of \$200 million. The proposal consists of a confidential preliminary report prepared by the task force (GT) that is analyzing the direction of the Brazilian nuclear program, with the cooperation of the Secretariat of Strategic Affairs (SAE) in Brasilia. According to the document, the GT recommends "continuing the laboratory activities until 1996 and, concurrently, having techniques interrelated with reprocessing developed." The reprocessing technology could be used for the manufacture of atomic bombs.

According to the report, the work is to be directed by the National Commission for Nuclear Energy (CNEN), through the Institute for Nuclear and Energy Research (IPEN) in Sao Paulo, as well as the Nuclear Technology Development Center [CDTN] in Minas Gerais. Based on the task force's assessment, the pilot plant should be built in the vicinity of the definitive storage facility for radioactive waste produced in the country, the site of which has not yet been determined. In the document, the GT reports that the plant could go into operation within the next 15 years, and precludes the possibility of creating a unit for reprocessing uranium on an industrial scale. The document also notes that the project involving a plant for laser enrichment of uranium is being prepared. The unit would cost \$15.7 million, and should be ready by 1993.

Partners

The manufacture of a Brazilian atomic bomb has been completely rejected by President Fernando Collor's government, as was guaranteed by the CNEN chairman, Jose Luiz de Santana Carvalho. Yesterday he assembled the task force responsible for reviewing the Brazilian nuclear program. Santana reported that the proposals to be submitted to the president do not include any attempt to ensure funds for a parallel program to be developed by the military. Carvalho affirmed that, "The military are CNEN's partners in its projects."

INDIA

Plans for Second Nuclear Submarine Denied

51500138A Calcutta THE TELEGRAPH in English
23 May 90 p 5

[Text] Pune, May 22 (PTI)—The chief of the Naval Staff, Admiral J. G. Nadkarni, today denied reports about India's plan to acquire a second nuclear submarine.

"As of now, we have neither plans to acquire a second nuclear submarine nor to build it ourselves," he told newsmen at INS Shivaji, the Naval Engineering Institute, at Lonavala off the Bombay-Poona road 60 km from here.

INS Chakra, the first nuclear submarine leased from the Soviet Union, was meant only to "improve our know-how," he said. On Pakistan's reported intention to add an atomic powered submarine to its naval fleet, Admiral Nadkarni said if Pakistan went ahead with its plan, "it would adversely affect the balance of power."

However, if Pakistan acquired it, "We have to give a fitting answer to them," he asserted. "We are watching the situation," he added.

Reportage, Comment on Alleged Pakistan Nuclear Bomb**Defense Analyst Subrahmanyam**

51500139A Bombay THE TIMES OF INDIA
in English 31 May 90 p 11

[Text] New Delhi, May 30 (PTI)—Pakistan is probably making arrangements to keep its nuclear weapons ready for use and to fine-tune its arsenal, the defence analyst, Mr. K. Subrahmanyam, feels.

Reacting to reports of Pakistan moving nuclear bombs to its military airfields to arm its F-16 fighter bombers, he says the Pakistanis are slowly trying to pass on the message to the world, mainly India, that they have nuclear bombs.

The former director of the Institute for Defence Studies and Analyses (IDSA) said that it is difficult to assess Islamabad's motive for moving the weapons from the top secret Kahuta nuclear complex to Sargodha airbase sheltering the American-built F-16 fighters.

"But the move appears to be a deterrent measure and at the moment it is not possible to conclude whether the Pakistanis are really going to drop a bomb over India in the event of a war," he says. "By taking the weapons out of the basement, Pakistan has given an ambiguous signal. But the real threat is yet to come," he adds.

The American spy satellite pictures only confirm earlier reports about Pakistan's nuclear capability and now there will be no use in following an "ostrich policy."

"We have been sleeping all these days. It is time we woke up to realities," Mr. Subrahmanyam suggests.

The reported Pakistani exercise of moving the nuclear bombs out of the "basement" to the military airbase and fitting them to the F-16 bombers capable of delivering the weapons is seen by IDSA experts as maximum preparedness.

Sargodha airbase is more than 200 kms from the Kahuta nuclear complex near Islamabad and the process of readying the weapons for delivery will be time consuming. Therefore, Pakistan is promptly fine-tuning the weapons and keeping them ready for use, they say.

Another reason behind Islamabad's bid to deploy nuclear weapons could be that the Pakistanis want to show Iraq that they have nuclear bombs, Mr. Subrahmanyam feels. This seems more logical in view of the ongoing Arab summit in Baghdad.

Pakistan is aware that the Iraqis possess chemical weapons and missiles of varied ranges, and now thought it proper to exhibit its nuclear strength.

Experts at the IDSA doubt whether Pakistan will actually use nuclear weapons against India as Islamabad is quite apprehensive that India has a second strike capability.

The Pakistanis are also pretty aware of India's geographic depth and feel that initiating a nuclear war will amount to self-destruction, the experts point out.

But what will Pakistan do if an Indo-Pak war does break out? Will it exercise its nuclear option? And if it does, what will be the likely targets?

To such hypothetical queries Mr. Subrahmanyam says selecting targets depends on Pakistan's intentions and "we don't know what they have in their mind." They will try to hit targets which will help them achieve their objectives.

Experts at the IDSA feel that industrial belts and economically important centres could be the probable Pakistani targets, as Islamabad would like to cripple India's economy. They think the Bombay-Pune area could be quite vulnerable.

If Pakistan wants to destroy the unity and integrity of India altogether they could strike the capital as well, some experts fear.

Leaving aside these assumptions and coming back to Western intelligence reports, Mr. Subrahmanyam says the reports have rendered meaningless suggestions and debates that are sceptical about Pakistan's nuclear capability.

Menon News Conference

51500139B Calcutta THE TELEGRAPH in English
3 Jun 90 p 4

[Text] Chandigarh, June 2 (PTI)—Prof. M. G. K. Menon, Union minister of state for science and technology, today ruled out the possible use of nuclear weapons in wars.

Addressing a news conference here, Prof. Menon said the government had no specific information about Pakistan transporting its nuclear weapons base from Quetta to its air bases. Neither is there evidence of Pakistan testing nuclear weapons in its territory, he said.

Referring to reports that Pakistan had exploded a nuclear weapon in China, Prof. Menon said it was difficult to know whose it was. "If a test was done by Pakistan, or for them outside Pakistan, it is difficult to find out," he said.

Prof. Menon said a number of wars have been fought after the Hiroshima-Nagasaki disaster, but nuclear weaponry had not been used, whether in Vietnam or between the Arabs and Israelis or between Iran and Iraq.

Prof. Menon said nuclear weapons can be used in aircraft only if one has the proper aircraft. Referring to reports of Pakistan trying to equip its F-16's with nuclear power, he said, "In order to do anything meaningful, a 1,000-pound functional system is needed."

When his attention was drawn to the publication of satellite pictures showing Pakistani aircraft with reports that nuclear weapons had been fitted on them, he said just by seeing the picture of aircraft one cannot judge its purpose. "I have no idea about Pakistan having nuclear energy and doubt the capability of Pakistan using it in its aircraft for war purposes," he said.

Cecil Victor Analysis

51500139C New Delhi PATRIOT in English 29 May 90
p 1

[Article by Cecil Victor: "Pak Bomb: Bid To Stampede India Into Talk Trap"]

[Text] The timely revelation that Pakistan's nuclear baby has crawled out of the basement is meant to persuade India that it must return to the negotiating table post-haste.

Western press reports of United States spy satellite photos of armed convoys leaving the Kahuta nuclear complex (near Rawalpindi) and heading for airfields where F-16 fighter-bombers, newly fitted with nuclear bomb racks and ready to take off for Indian destinations, have all the immediacy, latent terror and oblique entendre of an archane decoction.

This is quite obviously a U.S. official leak. Whether it is from the CIA, the National Security Agency, Defence Intelligence Agency, or the White House itself will only

be known much later. But it comes a few days after Robert Gates, deputy national security adviser and special envoy of President George Bush (also an old CIA hand), had told Prime Minister V. P. Singh that India must reopen the dialogue with Pakistan.

On the face of it the report has two main thrusts: The first is to posit the possibility of nuclear proliferation if India does not immediately withdraw its forces to peace stations. The blame for Pakistan going nuclear is therefore, obliquely, being laid at India's door.

The other is to ignite contradictory pressures within India to go nuclear immediately in response (and thereby give legitimacy to the Pakistani clandestine nuclear weapons programme); or resume talks to defuse a "potentially dangerous" situation.

The Government of India is thus faced with one option and a fait accompli. The option is to match Pakistan's nuclear weapons programme or let it take the plunge alone. The fait accompli is that India must return to the negotiating table to formalise the partition of Kashmir.

The status quo, therefore, is the product of Pakistani aggression (in 1948) bolstered and maintained in place by frequent infusions of conventional military hardware and a parallel clandestine bomb programme.

The alternative is stark destruction, enervating economic losses, socio-political regression caused by a high-tech, intense conventional war embroidered with nuclear mushroom-cloud applique.

These stark scenarios that one reads about these days are coming from Islamabad whose rules past and present are self-confessed abettors of terrorism (they have closed down 30 terrorist training camps!) and its friends who know that if India were to take the logical steps for the preservation of its territorial integrity the most obvious actions would be hot pursuit of fleeing terrorists; strikes against their bases and sanctuaries in Pakistan. The consequences for Pakistan would not be pleasant and would in any case lead to full-scale war.

When things came to a boil because of the above factors the last time, the US intervened and insisted that India begin a dialogue with the dictator Zia-ul-Haq to cool things. The result was that India became saddled with an impotent joint patrolling arrangement and we were left with the onus of stopping the Pak-trained narco-terrorists by ourselves.

Lulled into complacency by the military dictator's protestations of undying allegiance to the Simla Agreement we allowed ourselves to be trapped into talking when the insurgency spread from Punjab into Kashmir. That led to the infamous arrangement between Defence Secretaries of the two countries to demilitarise Siachen which was itself the epitome of breach of the Simla spirit and a manifestation of Pakistan's expansionist tendencies.

Talks are thus part of the tactics. The other is a sustained insurgency and encouragement to secessionism. All are part and parcel of the art of coercive diplomacy.

External Affairs Minister

51500139D New Delhi PATRIOT in English 24 May 90 p 7

[Text] Pakistan's quest for nuclear weapons is continuing and India will not compromise with its national security and will take all necessary measures to cope with any threat, External Affairs Minister Mr. I. K. Gujral told the Rajya Sabha on Wednesday, reports PTI.

Closely questioned on Pakistan's programme to acquire the atom bomb, Mr. Gujral said, it was difficult to say at what stage of development it was.

"Pakistan is definitely making efforts in this direction", he told Mr. Pramod Mahajan and others while replying to supplementaries during Question Hour.

To a question from Mr. M. C. Bhandare if the Government would not vacillate any further as Pakistan was "only half a turn of the screw from the Islamic bomb", Mr. Gujral said, let us not call the bomb by the name of any religion.

"It will be good for all of us not to get taken in by the rhetoric used by the media. Let us exercise more restraint", he said.

He said India's security was constantly under review in the light of developments in the neighbourhood. "In any event, there will be no compromise with national security and Government will take all necessary measures designed to cope with any threat that may be posed to the security of the nation", he said.

Mr. N. K. P. Salve, Congress asked how genuine was the nuclear threat to India from Pakistan?

Mr. Gujral said a senior member like him should know that the (Gujral) could not go beyond a particular point on this issue.

To a question from Mr. Mahajan, if India would exercise its nuclear option after the bomb had gone off, Mr. Gujral said "before the bomb explodes here we will review our policy".

Indian Bomb Advocated

51500139E Calcutta THE STATESMAN in English 21 May 90 p 6

[Article by J. A. Naik: "How Not To Face Nuclear Pakistan"]

[Text] The possibility of a war with Pakistan has become a live issue. The Indian Government has frequently referred to Islamabad's nuclear capability. The question is whether Pakistan is only capable of producing a nuclear device or whether it already possesses a few bombs. Mr. Jack Anderson, the American columnist,

says that Pakistan acquired a nuclear capability in May, 1983, with China conducting a test of the Pakistani bomb in the desert region north of Lop Nor. The Americans as well as the Swedes monitored this test.

The then External Affairs Minister, Mr. B. R. Bhagat, informed the Lok Sabha in the middle of 1985 that Pakistan had the capability of manufacturing three to five Hiroshima-type nuclear bombs per year. Going by this calculation, that country must by now possess at least 18 nuclear weapons. It also has a number of B-16 bombers which can carry these bombs to Indian targets; new missiles have also been developed which can carry these nuclear devices. If Pakistan already has the bomb and carriers, clearly she has become a full-fledged nuclear power.

Citing a classified Defence intelligence report, THE WASHINGTON POST informed its readers on November 4, 1986, that Pakistan had detonated a nuclear device between September 18 and 21, 1986. This test was Pakistan's second that year, according to the paper. On July 4, 1988, NEWSWEEK wrote that Pakistan had developed at least four nuclear weapons by the middle of 1988.

Once Pakistan had the bomb, it took the logical step of letting India know of the development. This message was conveyed by no less a person than the then President of Pakistan, General Zia-ul-Huq, himself. In an interview given to an Indian weekly, Zia said on October 15, 1985, that Pakistan had acquired uranium enrichment capability. "In a peaceful nuclear programme", he said, "or in any nuclear programme you can convert it into a non-peaceful one any time you like. It is within one's capability".

Stark Reality

In the face of such evidence, it would be suicidal to believe that Pakistan is "on the way to possessing the bomb" or that it is acquiring "the capability" of becoming a nuclear power. The stark reality is that Pakistan has already acquired nuclear weapons and the delivery systems to carry these weapons to select targets in North India, including New Delhi. If for some reason best known to our policy-makers we do not want to go nuclear even when Pakistan has done so, the Indian Government should not keep the nation in the dark about the fact of Pakistan's possession of the bomb.

So far our nuclear defence policy had rested on the assumption that if it came to the worst, the country could avail of Soviet nuclear protection which the Russians are expected to provide under the Indo-Soviet Treaty of Peace and Friendship of 1971. But does the treaty provide such protection?

Article IX of the treaty says: "In the event of either party being subjected to an attack or a threat thereof, the High Contracting parties shall immediately enter into mutual consultations in order to remove such threat and to take

appropriate effective measures to ensure peace and security of their countries." The Russians are bound by treaty to enter into mutual consultations about effective measures. But nothing beyond that.

Deterrence

The essence of nuclear defence is deterrence. They are meant to stop the enemy from carrying out a nuclear attack. Nuclear defence is meant to stop a first strike by the enemy. If Pakistan knows that India too possesses N-weapons and the requisite delivery systems, it may hesitate to use its own nuclear weapons against India.

Indian policy from Nehru to Mr. V. P. Singh has rested on the assumption that the country's enemies will not use nuclear weapons against India. Thus, even if Pakistan has the bomb it will not use it against India. But what is the basis for this assumption?

So far there have been two full-fledged wars between India and Pakistan, one in 1965 and another in 1971. On both occasions, the Indian Government had accused Pakistan of launching the first attack. Pakistan, on the other hand, had blamed India of starting the wars with attacks on Pakistani targets. The international Press carried the Indian and Pakistani versions side by side. I was in Moscow doing research on Soviet policy towards India when the 1965 war broke out and was surprised to see how even PRAVDA, the official newspaper of a friendly power, treated reports on the hostilities. During the entire course of the war, PRAVDA devoted almost exactly the same amount of space on its front pages to the Indian and Pakistani versions.

It is, therefore, possible that Pakistan may drop an N-bomb and accuse India of having used nuclear weapons first. The world press may carry both Indian and Pakistani versions side by side. After all, both the countries possessed the capability to make such weapons and how could the world believe that only Pakistan had made the bomb and not India.

Further, while no country will perhaps start a war with nuclear weapons, there is every possibility of these being used during the course of conventional warfare. Supposing that Pakistan allows Indian forces to march up to the gates of Lahore, will Islamabad be justified in using the "ultimate weapon" to prevent the fall of Lahore? Will Pakistan be deterred by world public opinion at such a time?

IRAN

Huge Uranium Reserves Confirmed in Saghand Mine

LD1207185790 Tehran Television Service in Persian
1700 GMT 12 Jul 90

[Summary] The head of the Atomic Energy Organization announced that exploration work is in progress in the Saghand and Khoshomi uranium mines in Yazd. With

confirmed reserves of 5,000 tonnes, Saghand has one of the world's largest uranium deposits, he said.

There are large reserves of uranium and other minerals in the central desert areas of Iran, he added.

IRAQ

Saddam Questioned About Nuclear Weapons

JN1007185590 Baghdad INA in Arabic 1630 GMT
10 Jul 90

[Text of interview with President Saddam Husayn in Baghdad by French reporters Patrick Darfourd and Cathrine Jentile from the First French Television Channel on 8 Jul—names of reporters as received]

[Excerpt] Baghdad, 10 Jul (INA)—[passage omitted]

[INA] Mr. President, it is said that Iraq is about to acquire nuclear weapons, or that it actually has such weapons. What do you say to that?

[Saddam] An uproar has been raised in the Western media ever since we achieved victory in the war. This tendentious media campaign used various slogans from time to time. It has raised the issue of chemical use during the war, human rights in general, and persecution of the Iraqi Kurds, and it also found a new slogan in Bazoft. It then raised the matter of Iraq's obtaining a giant gun. Before that, it said that Iraqi possessed long-range missiles, as if it had discovered that for the first time. Iraq used them during an exchange of bombardment between Iraq and Iran in wartime. The bombardment was started by Iran attacking Baghdad. After these issues were clarified, the talk centered on the possibility that Iraq might possess the atomic bomb. Here, I do not want to say whether it is legitimate for the Arabs to have every type of weapon to confront a real weapon possessed by their enemy. I say that these slogans, especially those concerning nuclear weapons, exist only in the Western media and press. They do not exist in reality. However, if any Western country wishes to help us manufacture a nuclear bomb to counter the real one in Israel, we will not object. Will you urge the Westerners to counterbalance the Israeli atomic weapon by helping the Arabs acquire nuclear weapons, to remove mass destruction weapons from the region, or to pressure Israel into accepting the slogan raised by Iraq and officially presented to the United Nations by Egypt?

[INA] It seems to me that you are concerned over a possible recurrence of the attack on Iraq by Israel nine years ago. Is this concern due to information that such an attack on Iraq by Israel is possible?

[Saddam] Have we not the right to be anxious, as Israel dealt a surprise blow to us in 1981? Yes, we have information. The Zionist media atmosphere in the West suggested preparation for an Israeli attack on Iraq.

[INA] Do you intend to wipe Israel off the world map?

[Saddam] We never said that at any time. What we said was that if Israel attacked Iraq, or threatened it with the nuclear bombs it possesses, then we have the weapons that can burn half of Israel. Why did De Gaulle insist that France possess the nuclear bomb? He insisted on it because the superpowers and some major powers possessed nuclear bombs. Therefore, De Gaulle, out of his patriotism, insisted that France possess the nuclear bomb. But De Gaulle did not use it against humanity but protected France's humanity with it. He might have created a balance in the world in order to protect the humanity of the whole world. [passage omitted]

ISRAEL

Air Force Commander Discusses Offensive Weapons

TA1707091290 Jerusalem THE JERUSALEM POST in English 17 Jul 90 p 12

[Report by Joshua Brilliant]

[Excerpts] Instead of pouring fortunes into defense systems, Israel should invest in offensive weaponry and win a war quickly, Air Force Commander Maj.-Gen. Avihu Bin-Nun said yesterday. [passage omitted]

A military source who also briefed reporters said that Iraq's al-Husayn missiles, if fired from western Iraq, could hit all of Israel's "urban areas." The missiles are currently equipped with conventional warheads, but Iraq's arms development capabilities suggest that Baghdad may equip them with chemical warheads within a year or two.

The Air Force commander said that the American Patriot missile offers a "partial solution" to the Arab missile threat. The Israeli-developed Arrow has "the potential of being a very good answer to the ground-to-ground missile threat," but it is still at the stage of "feasibility studies."

He suggested that a combination of Patriot and Arrow missiles would offer the best protection, and said the defense establishment was examining the possibility of leasing Patriots.

But he warned that in stressing "defensive tactics, without an offensive capability," Israel may find itself unable to "withstand a prolonged war. If we invest in defenses, we may neutralize our ability to decide (a war)." [passage omitted]

Powell, Arens Discuss Arrow Project, Cooperation

TA1207182890 Jerusalem Domestic Service in Hebrew 1605 GMT 12 Jul 90

[Text] General Colin Powell, chairman of the U.S. Joint Chiefs of Staff, arrived in Israel today. He ended his meeting with Defense Minister Moshe Arens a short while ago. Before that he conferred with Lieutenant General Dan Shomron, the chief of staff.

Defense Minister Arens said at the end of the meeting with his guest that the issue of the Arrow project was brought up. It is this project that will apparently be the answer to the Arab surface-to-surface missile threat. Our correspondent Karmela Menashe reports:

[Begin recording] [Menashe] The meeting began in a closed forum in the defense minister's office. The forum included Lt. Gen. Dan Shomron, the chief of staff; the defense minister's military secretary; the director general of the Defense Ministry; Israel's Defense and Armed Forces attache in Washington; and the U.S. ambassador in Israel.

At the end of the meeting, Defense Minister Moshe Arens said that the talks offered an opportunity to concentrate, in a short time, on key issues like strategic cooperation. It also was a chance to inform the U.S. general of the threats Israel is facing; note the elements contributing to its deterrent capability in the face of the Arab countries, emphasizing that Israel's ties with the United States constitute an important component in that deterrent capability; and discuss the weapons systems Israel is developing, which provide an answer to the unfavorable balance between it and the Arab countries.

The defense minister said that the U.S. chairman of the Joint Chiefs of Staff outlined the problems he encounters in the face of Congress and the demands for defense budget cuts as a result of the end of the Cold War.

Minister Arens added that he told Gen. Powell that it is precisely now, when the United States is about to minimize its presence in Europe, that Israeli-U.S. relations have become doubly important:

[Arens] The Middle East problems still exist, and will probably exist in the future as well. Israeli-U.S. relations are consequently very important.

[Menashe] Did the issue of the financing of the Arrow project come up?

[Arens] I mentioned the Arrow project to Gen. Powell. Naturally, he is familiar with the project. It was my understanding that he has a high regard for Israel's technological feats in this regard, which in many respects are truly unprecedented. We have probably found the answer to the surface-to-surface missiles.

The project is financed largely—though not completely—by the United States. We expect the U.S. Government to continue to finance this project, and allow us to end the development stage successfully so that it can be procured.

[Menashe] Did the repeated threats by Iraqi President Saddam Husayn feature in your discussions?

[Arens] Yes, of course. We discussed that, too, and it was in this context that we mentioned the threat presented by the surface-to-surface missiles.

[Menashe] U.S. Gen. Colin Powell arrived in Israel after a visit to Jordan, Egypt, Tunisia, and Morocco. [end recording]

PAKISTAN

Tritium Transfer to Nuclear Weapons Program Detailed

90WP0104A Paris POLITIS—LE CITOYEN in French 22-28 Feb 90 pp 50-55

[Article by Mycle Schneider: "Paris: Hub for Pakistani Nuclear Traffic"]

[Text] Nuclear matters were discussed a great deal these last few days in Pakistan, in connection with Francois Mitterrand's official visit. In addition to a power plant, Islamabad wanted a friendly resolution of the long-disputed contract for a reprocessing plant, which France broke in 1979 under pressure from the United States. The reason given at the time: concern about nonproliferation of nuclear weapons. Since that time, Pakistan has apparently succeeded in building an atomic bomb, bypassing embargoes on the materials and components necessary to its production, such as tritium and zircalloy... On 12 January West German police arrested a certain Mr. Ortmyer and four of his accomplices who allegedly helped the Pakistanis get around international laws. The nerve center of the operation: the Pakistani Embassy in Paris, and more precisely Dr. Hassibullah, chief of its technology and science section...

Altenhasslau is a small German village near Gelnhausen, in Hesse. A certain cab driver takes a day's leave, but not to take a stroll in the park nearby or to sunbathe in his yard. His mission is one that must be carried out in absolute secrecy. He will not take any passengers.

He drives to Gelnhausen, to the home of Rudolph Maximilian Ortmyer, his employer for the day, receives an envelope from him, and starts off again immediately. His itinerary is longer than usual. After two hours he arrives in the capital. The addressee in Bonn is contacted: It is Dr. Abdul Wahid, the Pakistani ambassador himself. The latter opens the envelope and sends a second envelope inside it by diplomatic courier to Paris. The recipient, Dr. Hassibullah, attached to the technology and science section of the Pakistani Embassy in Paris, waits impatiently for the letter. A lot is at stake. Hassibullah and his section are responsible for organizing clandestine acquisition throughout Europe of materials and components for the nuclear facilities that will enable Pakistan to perfect the ultimate weapon, an atomic bomb.

It all began in 1974, with the "peaceful" detonation of India's first nuclear bomb. In neighboring Pakistan, then Prime Minister Zulfikar Ali Bhutto, Benadir's father, launched an ambitious program to narrow the nuclear weaponry gap. In October 1974, scarcely six months after the Indian nuclear test, SGN (then Saint Gobain

Nucleaire, today General Company for New Technologies) signed a contract to build Pakistan a reprocessing plant. Reprocessing consists of separating plutonium—the highest-grade raw material for an atomic weapon—from spent nuclear fuel. The plant never got past the laboratory stage. In 1979 the French Government bowed to U.S. diplomatic pressure and the nuclear weapons nonproliferation policy (see below): It abandoned the project. Legal acquisition of the technology was completely blocked.

So Pakistan set about exploring other ways to get the materials needed to fabricate the bomb. Along with an American research reactor and a Canadian nuclear power plant, both under international controls, Ali Bhutto established a large research center. Pakistani scientists went for training in all the countries with nuclear programs: the United States, France, the FRG, Belgium, the Netherlands....

In 1975 Dr. Abdul Qadeer Khan fled the Netherlands, taking with him the ultra-secret plans for a uranium enrichment plant. There are two ways of making an atomic bomb: plutonium (Nagasaki) or highly enriched uranium (Hiroshima). Dr. Khan is now considered the head of Pakistan's military program. But plans alone were not enough. The project required very sophisticated materials and facilities. The personnel of the Pakistan Atomic Energy Commission (PAEC) built up a fantastic network of clandestine suppliers around the world. And the hub of the traffic was to be the Pakistani Embassy in Paris.

Sixty-Two Truckloads

Engineer Albrecht Migule of Freiberg, West Germany, receives an order for a long list of parts. He buys a little here, a little there, and sends entire caravans of equipment to Pakistan: 62 truckloads in all. The value of the equipment: about Fr50 million. In April 1980, at Multan in the middle of the Pakistani desert, a new facility was opened. Its purpose: conversion of uranium into UF₆, a critical pre-enrichment operation. Migule was arrested five years later, receiving an eight-month prison sentence and a Fr100,000 fine.

The Leybold and Heraeus Company at Hanau, in Hesse, gets an order for equipment needed to load and unload uranium fuel destined for enrichment. Leybold and Heraeus delivers the parts to its subsidiary in France, Leybold and Heraeus Sogev, in which Thomson-Brandt owns a 32-percent interest and which operates a plant at Bourg-les-Valence, where the parts are assembled. Next, as German intelligence agencies report in a memo to the minister of economic affairs dated 12 January 1984, "the supply route goes from Valence to Paris and from there, via Air France, to Dubai and on to Pakistan."

But the top agent involved in this traffic, the "businessman" for the network, was Rudolph Maximilian Ortmyer, the head of NTG (Neue Technologien GmbH). Ortmyer was the key figure in efforts by the Pakistani Embassy in Paris to achieve its objectives. In the spring

of 1987, Ortmyer's news was particularly encouraging: He had made all the arrangements to deliver a significant quantity of tritium, as well as all the equipment needed to separate and enrich this tritium. Delivery would take place before the year's end. The ambassador in Paris expressed his satisfaction in a letter sent by secure channels to another address. For some time, Ortmyer had preferred that correspondence no longer be routed through his company. He received the courier from Paris at his own home, at the home of his secretary, Madame Reuter, or sometimes at his mother-in-law's place. Hassibullah paid the agreed-upon sum, as usual, without delay.

Hassibullah's section of the embassy in Paris had a special account with the Frankfurt subsidiary of the National Bank of Pakistan which it used for this type of expense. Black-market transactions of this kind are expensive, very expensive. As early as 1980, the German clandestine agency BND [Federal Intelligence Service] identified the source of the funds, in a report to the chancellor dated 4 July which has been reported in the German magazine STERN. Libya had allegedly offered to finance the Pakistani project, "on condition that Pakistan train Libyan personnel as part of the program. Pakistan took on 18 Libyans: Libya made \$100 million available."

On the account books of the National Bank of Pakistan in Frankfurt, German investigators found that Fr 350 million in questionable transfers had been made to some 50 West German companies. "In these entries we do not find any Pakistani companies appearing as clients. Instead, as in many cases where we know the client did not want to be exposed, we find the embassy in Paris," explains the public prosecutor of Hanau, Reinhard Hubner. And specifically "the division that interests us," the technology and science section. The embassy in Bonn played the role of a mail drop. "When important matters were at stake, personal contacts were made with the Pakistani Embassy in Paris," adds Hubner.

Efficiency Factor

For a long time the top dog, the "main buyer," was a certain Mr. Butt, one of the directors of the PAEC, a Pakistani army officer well-known to the intelligence services under the name "Mister Fish." In 1985, Butt changed his name. One of his men was caught red-handed by the CIA. Butt was henceforth called Dr. Shef. Some time later Butt or Shef was replaced at the embassy in Paris by Mr. Hassibullah, who from then on was the man calling the shots.

It was he who gave the orders, arranged the logistics, handled transfers of funds. It was then up to Ortmyer to acquire the materials. As for the tritium...

Tritium is one of the isotopes of hydrogen (H_3 or T), unstable and radioactive. It is used, in very small quantities on the order of several milligrams, as a source of luminescence for emergency exits, road signs, watches, etc. In fission bombs, tritium serves as an amplifier,

facilitating miniaturization and augmenting precision. In fusion bombs (H-bombs), it is indispensable. According to the Nuclear Control Institute of Washington, "tritium is the key to compact and effective design in modern nuclear weapons." To limit the risk of proliferation, American regulations require special authorization for the export of tritium in amounts greater than one milligram per object! Today almost all tritium is produced in countries that have nuclear weapons. France produces it in the Celestin-1 and Celestin-2 reactors at the Marcoule military facility in Gard.

The tritium used in bombs must be replenished frequently, since it decays so rapidly (5.5 percent per year) into helium. Its half-life, the time it takes to lose half its radioactivity, is 12.3 years. This characteristic led the Nuclear Control Institute to propose the "tritium factor" as a sort of "natural disarmament." In April 1988 the United States was forced to close its producing reactors at Savannah River for safety reasons. The Nuclear Control Institute proposed, as an alternative to resuming production, that weapons levels be reduced as tritium stocks decline. Since production at Savannah River stopped, the price of tritium has more than doubled. On the black market, prices began to skyrocket.

Urgent Entreaties

In 1985, Radium Chemie AG, a company based in Teufen, Saint-Gall, in Switzerland, acquired a tritium facility from the Nuclear Research Center of Julich, near Cologne. A heavy-water research reactor produces tritium as a by-product. Before being transported to Switzerland, the tritium is sent to the Grenoble Nuclear Research Center (CENG), where it is purified. According to an investigative report by the Swiss weekly SONNTAGSZEITUNG, three containers with a total of 7.9 grams of tritium were delivered to Teufen. Most of it was used to make luminescent paint, but 0.3 gram of military-grade tritium, 95-percent pure, was sold to a frequent client, the Gutekunst Leuchtfarben company based in Villingen-Schwenningen, West Germany. In 1987, Gutekunst ordered more tritium. Radium Chemie sent it 0.5 gram remaining from a 1980 Soviet delivery. Responding to Pakistan's urgent entreaties, Ortmyer made contact with Gutekunst and secured the delivery of 0.8 gram of tritium.

There remained the task of getting the tritium to Pakistan. With the help of the forwarding agent, Mr. Crost, Ortmyer and his contacts devised an ingenious solution. They applied to the West German authorities for permission to export it to Hong Kong, to a factory that manufactures luminescent paint for watches. The authorization was granted. In reality, the containers shipped there were empty. At the same time, Gutekunst sent the tritium to Pakistan in containers falsely declared to be empty.

The trickery employed by the traffickers to deliver an entire system for the purification and enrichment of tritium—a process called TROC (Tritium Removal with

Organic Compounds)—was also something right out of detective fiction. First of all, it was necessary to find qualified technicians. Ortmayer therefore put on his payroll about ten individuals employed with well-known research centers and companies such as Degussa and RBU in Hanau, or Metallgesellschaft in Frankfurt. Most of the time these technicians topped off their monthly salaries without the knowledge of their employers. For example, since 1981 Ortmayer paid DM1,000 (about Fr 3,400) per month to a certain Weichselgartner, director of the tritium laboratory of the Max Planck Institute for Plasma Physics (IPP) located in southern West Germany, for consultant services. It was he who "arranged the deal with the 0.8 gram of tritium," as he himself describes it. IPP's personnel director, Dr. Duisburg, was also in the know, because in 1986 Weichselgartner became a part-time employee. Duisburg advised him to set up a company in his wife's name in order to profit from the wholesaler's discount for equipment acquired for Ortmayer. No sooner said than done.

The new enterprise, CTB (Chemisch-Technische-Beratung), was not the only phantom company. Ortmayer took pains to keep his "real" company, NTG, from coming to the authorities' attention. To cover his tracks, he established another company called PTB (Physikalische-Technische Beratung) to serve as an intermediary in forwarding deliveries to Pakistan. A third man, physicist Peter Finke, completed Ortmayer's core team.

In the meantime, the CIA had not been sitting on its hands. On 13 March 1986 the U.S. State Department delivered what is called a "nonpaper," a document bearing no letterhead or signature, to its West German counterpart. The document said that a certain firm, Linde AG of Munich, had been identified as a possible supplier of the TROC. Linde confirmed its contacts with Ortmayer. The Americans were quite upset about this. So upset that on 24 April 1986 they managed to get TROC-type systems added to the COCOM (Coordinating Committee for Multilateral Strategic Export Controls) list restricting the export of sensitive materials from the industrialized Western countries to countries considered "at risk," notably the Soviet Bloc. The new COCOM accord went into effect on 5 November 1986, but its provisions were not incorporated into German law until 25 March 1988.

Evasive Responses

Certain offices in the German Ministry of Economic Affairs played a questionable role, to say the least, in all this nuclear trafficking. They did not seem to be impressed by the American fears. In an internal memorandum of 21 December 1988, the Ministry of Foreign Affairs in Bonn complained that five letters and numerous telephone calls between March 1986 and June 1988 elicited only "evasive or insufficient" responses. The economic ministry reportedly marked the case closed as soon as Ortmayer advised that the project had been abandoned for financial reasons. "Since then, we

have not pursued the project," he assured the ministry. The truth was exactly the opposite. In fact, the Ortmayer-Weichselgartner-Finke trio concluded the deal with the Pakistani Embassy in Paris. Ortmayer negotiated the price (probably DM3 million, or more than Fr 10 million), Weichselgartner designed the equipment, and Finke went to Pakistan to help out with construction. The materials were purchased by CTB, resold on paper, and shipped by the other phantom company, PTB. The airplane took off from Frankfurt on 31 May 1987, and the TROC—declared as a "waste handling system"—was on its way to Kahouta, a nuclear site 150 km south of Rawalpindi where Pakistan has established its "parallel" nuclear program, under the permanent protection of anti-aircraft batteries meant to deter an Indian attack. Finke, who went there himself to get the plant in operation, understood perfectly the real purpose of the installation: "Clearly, the fabrication of bombs."

Ignorance

Theoretically, it can produce five to 10 grams of pure tritium per day. That is an enormous amount, considering the very small quantity necessary for each bomb (from a few milligrams up to several grams). A year after the plant went into operation, the Pakistanis still feigned ignorance. Thus Saiyid Zaidi, director of the PAEC, stated in the specialized bulletin NUCLEAR FUEL: "I do not even know what a tritium purification unit is."

As one can see, the European network was a smooth operation. For years, the Pakistani Embassy in Paris continued to pass orders to Ortmayer, who employed all manner of wiles to fill them promptly. Many companies have been implicated, in Germany as well as in France. And that only covers the tritium.... The French firm Pechiney, for example, shipped supplies of zircalloy quite illegally to prohibited destinations (see below). It was not until 10 January 1990 that Ortmayer was finally arrested and his network dismantled. But it is probably too late. The operation has already borne fruit. In 1986 the head of the program, A.Q. Khan, announced that Pakistan had the capability to enrich uranium. Zia ul-Haq then told the HERALD TRIBUNE: "You can write that Pakistan is capable of building the bomb whenever it wants. Once the technology is acquired, you do what you want: utilization for peaceful or military ends." On 18 November 1987, at a meeting of the nonproliferation working group of European Political Cooperation [CPE], the foreign policy arm of the European Community, the British representative declared himself convinced that Pakistan has "a few small" nuclear weapons and said intelligence had confirmed it. As for India, it was reportedly able to produce them on two weeks' notice, if it had not done so already. The American magazine U.S. NEWS AND WORLD REPORT said the same month that Pakistan had an arsenal of six uranium-based nuclear bombs and was starting work on plutonium bombs. A.Q. Khan told an Indian journalist three years ago: "It must be clearly understood that we will use the bomb if our existence is

threatened." On 5 February a serious military confrontation erupted all along the Kashmir frontier. It is only one step from there to a "threat to one's existence."

Pechiney Supplies Islamabad From 1984 to 1988

Tritium was not the only critical element Pakistan sought in its quest for the bomb.... Since the establishment of its military nuclear program, obtaining zircalloy has also been a problem. Zircalloy is a unique zirconium-based metal used for the fabrication of fuel sheaths. It is thus basically for the operation of a nuclear reactor. Here again, Pakistan availed itself of the Ortmayer network, which kept supplies coming from 1983 to 1988. Initially, Ortmayer bought the zirconium from India's National Fuels Company and shipped it to the FRG for delivery to the supplier's traditional enemy. But the Pakistanis—adding insult to injury—complained of the poor quality of the Indian zirconium. Ortmayer had to find another supplier. He made contact with Pechiney representatives in the FRG. Pechiney has two specialized subsidiaries: Cezus, a wholly-owned subsidiary, which produces zirconium, and Zircotube (owned 51 percent by Pechiney and 49 percent by Framatome), which produces zircalloy tubes. Cezus and Zircotube accepted Ortmayer's offer.

Then another person entered the scene. Mr. Wellensieck was the Karachi representative of a Hamburg-based company, Rieckermann. He also played ball with Ortmayer's Pakistan schemes. Wellensieck invented another company, Switzerland-based MVG (Metall-Vertriebs-Gesellschaft) to take part in the hide-and-seek game. MVG did not really exist. Wellensieck had letterhead stationery bearing a fictitious address printed for it in the FRG. The deal worked this way: NTG bought material from the two French companies, then resold it on paper to PTB, which in turn transferred it to MVG, which, as we have pointed out, did not exist. Physically, the material was sent to Frankfurt, where the labelling was altered. The zirconium became "special steel," and the destination became Pakistan. There was no export authorization.

In 1985, Quai d'Orsay finally focused on the fact that although the FRG had no heavy-water reactors it was receiving a great quantity of the zircalloy tubes used in that kind of reactor. Export authorizations were suspended, and Cezus was asked what country was the real destination of the deliveries.

The subsequent events have been related by Reinhard Hubner, the public prosecutor of Hanau, who testified as follows in closed session before members of the investigating committee of the German parliament: "In close consultation, representatives of Pechiney and Mr. Ortmayer agreed to name India, rather than Pakistan, as the destination country. Which they did, claiming that India insisted on secrecy in order to protect its position on the world market." The French "regulators" were content with that explanation, and exports were permitted to continue. At the same time, however, Quai d'Orsay passed the information to its counterpart in Bonn. The

German officials were not satisfied with these explanations and requested that the economic ministry monitor the exports shipped out by Ortmayer's NTG. Functionaries at the ministry cooperated to this extent: One of them immediately called Ortmayer on the telephone to read him the demand from the Ministry of Foreign Affairs. The investigation was choked off at its inception.

So Ortmayer was able to continue making deliveries. Through the summer of 1988, he succeeded in transferring illegally to Pakistan probably more than 30 tons of zirconium and zircalloy tubes ... from France.

FRG Foreign Ministry Document

Report by the West German Ministry of Foreign Affairs on the 18 November 1987 meeting of the working group on nonproliferation of the policy committee of the CPE: Great Britain expressed its serious concern about the Indian subcontinent. Its representative declared himself convinced that Pakistan is in possession of "a few small" nuclear weapons, information which was confirmed by British intelligence. India, for its part, according to the same document, has the capacity to produce nuclear weapons on two weeks' notice, if it has not done so already.

[Translation of German text of document described as first page of FRG Foreign Ministry document]

Re: Meeting 18-19 November 1987 in Brussels of European Political Cooperation nonproliferation working group

Here: India/Pakistan

1. GB [the British representative] expressed his deep concern about the situation on the Indian subcontinent ("five minutes before 12"). In a bilateral meeting before the session, he said he was convinced that Pakistan had "a few small" nuclear weapons and that the British Secret Service confirmed this.

India, if it does not already possess nuclear weapons, would be able to manufacture them within 14 days.

2. During the session, GB described a resolution which is before the U.S. Congress, stipulating that the United States will cut off its financial aid for Pakistan because of the Pakistani nuclear program. He stated that American Ambassador Kennedy had told him the Pakistanis had broken their promise to the United States not to enrich uranium more than five percent.

3. B [the Belgian representative] raised the question of why Pakistan was building a reprocessing plant and what was the source of the irradiated material, if one assumed that all Pakistani plants are under safeguards. National [illegible] could, in her opinion, be an explanation—if an improbable one. The irradiated material could also come from other countries, or the safeguard....

Bhutto Denies Nuclear Weapons Program

*LD1207134890 Kuwait KUNA in English 0940 GMT
12 Jul 90*

[Excerpt] Kuwait, July 12 (KUNA)—Pakistani Premier Benazir Bhutto Thursday renewed denial that her country owns or intends to manufacture a nuclear bomb.

Answering a KUNA question at a press conference shortly before her departure after an official two-day visit to Kuwait, Bhutto said that Islamabad "has a modest nuclear program" aimed at promoting technology and knowledge.

Describing media claims in that regard as mere unfounded doubts, Bhutto said that although Pakistan did not sign the Nuclear Non-Proliferation Treaty, yet it abides by the articles and principles necessary to avoid proliferation of nuclear arms.

She said that her country had proposed to neighboring India a set of proposals to ensure that their region would be nuclear-free and said "we are pleased that we have an agreement with India on non-attack on each other's nuclear facilities." [passage omitted]

Nuclear Power Minister Interviewed on U.S. Accord

904E0132A Moscow *EKONOMIKA I ZHIZN*
in Russian No 29, Jul 90 p 20

[Interview with V.F. Konovalov, USSR minister for atomic energy and industry, by special TASS correspondent R. Akhmetov: "USSR-U.S.: The Uniting Atom"]

[Text] *Even at the height of the "cold war," Soviet-American cooperation continued uninterrupted in the field of the peaceful use of atomic energy. The work of scientists in both countries to not only continue, but also expand the program of joint research in this important field of world science has been reinforced by the signing in Washington of a new agreement by the heads of the Soviet Union and the United States.*

A special TASS correspondent has conducted an interview with the minister for atomic energy and industry of the USSR, V.F. Konovalov.

[Akhmetov] Vitaliy Fedorovich, let's begin with a question: Do we need nuclear power after everything that has happened?

[Konovalov] I haven't the slightest doubts about it. Let me explain my position. Energy is one of the basic sectors of any state. It's not for nothing that a country's economic potential is judged by the amount of electric energy produced per capita.

The world economy is moving forward, consuming ever greater amounts of electric power. According to the estimates of the general director of the International Atomic Energy Agency (IAEA), H. Blix, its demand will practically double in the next 15-20 years. The question arises: What kind of energy can satisfy this demand, taking into account the ecological aspects? It is naive and shortsighted to assume that the demand can be met by building thermal electric power plants, burning millions of tons of organic fuel in boilers and emitting a gigantic amount of ash and carbon dioxide into the atmosphere. It is largely due to thermal electricity plants that the world has experienced "acid" rains—destroying reservoirs, trees and vegetation—and the "greenhouse effect." Many scientists believe that a further growth in the concentration of carbon dioxide in the atmosphere, and its consequent overheating of the planet, can result in the heating up of the climate, melting of the polar icecaps, floods, and a change in the earth's topography.

The world can be supplied with energy, and the air basin of cities cleaned up, only by resort to nuclear electricity plants—ecologically clean power sources. They are in operation in over twenty countries and produce about sixteen percent of the world's electric power.

[Akhmetov] It's not that simple today to develop nuclear power. After the Chernobyl accident some of the public actively opposes AES's (nuclear power

plants). It's true that this involves a confusion of facts, fears, speculation and misinformation, but sometimes anti-nuclear attitudes win out. The rate of commissioning AES's in our country has dropped substantially, and several operating reactors have been shut down for a variety of reasons. It would seem that only the appearance of safe AES's could form the turning point in the country and restore the public's trust in nuclear power. What does Soviet-American cooperation hold in store in this regard for peaceful use of nuclear power?

[Konovalov] It should be recalled that this cooperation began back in 1973, and was extended by mutual agreement in 1983, 1988 and 1989. The recent signing of an agreement in Washington has opened up a new stage in the joint work of Soviet and American specialists. Two important topics have been included in the existing program: the operating safety of AES's, and everything related to treating radioactive wastes.

Until recently, cooperation focused on raising the safety of nuclear reactors at the stage of their design, construction and operation. This was the central factor, since the scale of use of nuclear power in the world is growing.

The joint working programs are going very successfully. The sides exchange data on the causes for equipment breakdowns, share their experience in reactor operation and original design solutions, and study the practice of supervising and inspecting reactor plants in the USSR and USA. Advanced research is under way to study the health effects of radiation.

The new five-year agreement has significantly expanded the range of basic and applied work. A comprehensive goal has been set: to direct the work of both countries' scientists towards ensuring the operational safety of the nuclear plant as a whole.

A study of accidents in the USA and USSR reveals that they do not occur spontaneously. They are the result of erroneous actions of operators or of incorrect work organization. The new agreement thus devotes particular attention to the training of personnel for the management and monitoring of equipment operation, the mutual use of scientific and engineering experience. I can report with satisfaction that Soviet and American specialists have already undertaken work in this area at the Novovoronezh AES.

[Akhmetov] Before meeting with you I was listening to Moscow radio. There was a program on the worsening ecological situation in the country. The question arises: how to get out of it? One of the directors of the capital's antinuclear club put it as follows: the only way to survive is to completely eliminate nuclear power plants at their present technical level.

[Konovalov] A familiar statement. And what does he propose instead? Wood? Candles? No matter what

antinuclear activists may say, I am convinced that in the long run we cannot do without atomic energy based on new-generation AES's.

Such plants will be safer, more reliable and have better technical and economic performance. Development is already under way on a new generation of 500-600 and 1,000-1,300 megawatt reactors. The latter are huge power plants. AES safety will be assured not so much by the most sophisticated systems for monitoring, automatic control, backup power and other technical novelties as by the reactors' internal safety. This is a fundamentally new direction in modern reactor construction.

[Akhmetov] What can you say about the processing and storage of radioactive wastes? Our press has recently focused attention on this.

[Konovalov] This problem exists here, in the USA and in other countries. Debates are under way on the safest and most economical solution. I assume that the cooperation beginning in this area will help lead to the optimal variant.

Despite the fact that each government has its own rules for handling nuclear waste, common questions can be solved together. A delegation of Soviet specialists visited several nuclear centers in the USA for this purpose. Conversations and scientific discussions with American colleagues defined the problems of mutual interest, and promising solutions were found which promise substantial economic gains for both countries. This inspires hope that new scientific solutions will be found in future contacts.

[Akhmetov] In what directions are traditional scientific and technical ties developing between the USSR and USA on the peaceful use of nuclear power?

[Konovalov] Cooperation has been under way for many years on controlled thermonuclear fusion. When science has mastered it, construction will begin on thermonuclear electricity plants that are ecologically clean and practically inexhaustible sources of power.

This is a gigantic research work for the future. The planet presently contains enough oil, coal, natural gas and uranium for AES's. But the time is coming when these energy sources will be exhausted. They must be replaced by thermonuclear power; mankind must be freed once and for all from energy "hunger."

[Akhmetov] Research on controlled thermonuclear fusion both here and abroad has been under way for over thirty years, but there is still no industrial reactor.

[Konovalov] There's a reason for that. In contrast to atomic reactors, where energy is obtained by splitting heavy nuclei of uranium, in a thermonuclear reaction there occurs the fusion (merging) of light nuclei of

hydrogen isotopes, accompanied by the release of a colossal amount of energy. This is the process that occurs in the interior of stars, causing them to emit light, and provides a gigantic flow of energy from the sun. Reproducing under earth's conditions the thermonuclear fusion that takes place in stars has turned out to be an extraordinarily difficult task.

Nevertheless, scientists are persistently advancing towards their goal. The most promising for research are "Tokamak" thermonuclear devices with magnetic containment of the plasma, whose idea was suggested by Soviet scientists. This route has also been adopted by specialists in the USA, Japan and several countries of Western Europe. There are forecasts that the first experimental reactor will appear as early as the end of this century. As they say, we'll live and see.

Another direction is related to fast reactors. In conventional slow reactors, less than one percent of the uranium is "burned." The remainder ends up as waste. It's extremely inefficient to work on building only these types of power plants. Fast reactors are another matter. They have marked a turning point in nuclear power. They allow all the uranium obtained to be used.

Our country is a pioneer in this. Experimental fast neutron reactors have been in successful operation for a long time at the Beloyarsk AES and the AES in the city of Shevchenko on the shore of the Caspian Sea. There are also similar such plants abroad. We have accumulated valuable experience in the design, construction and operation of fast reactors, which we are sharing with our American colleagues. The cooperation is aimed at studying the basic and applied problems related to the safe operation of fast reactors. Their design is much more complicated than that of conventional power plants.

I should also briefly describe one other direction of cooperation: the study of the basic properties of matter. This area of scientific research is becoming increasingly complicated, and requires a joining of the best minds of both countries' scientists. The program provides for long-term research in high-energy physics, nuclear physics and materials technology.

[Akhmetov] Vitaliy Fedorovich, what do you see as the reason for cooperation? How do you evaluate its results?

[Konovalov] Joining together the scientific and engineering potentials of two powers to solve major problems makes it possible to obtain results much faster and at lower cost. The degree of risk is also reduced in making strategic decisions of both long-term scientific programs and questions of nuclear power.

Soviet-American cooperation is happening in a stable manner and at a high scientific and technical level. It is yielding tangible results which are enriching world science. Its ultimate goal is the development of highly efficient, safe and ecologically clean sources of energy.

The joint work of specialists will benefit not only the peoples of the USSR and USA, but all mankind. Because energy and ecology are among those global problems which most concern the planet's inhabitants.

Nuclear Power Plants of the World (1988)

Countries	Power of nuclear reactors (power units), million kilowatt	Electricity output, billions of kilowatt hours
USA	102	554
France	54.3	275
USSR	35.4	216
Japan	28.0	175
FRG	22.6	145
Great Britain	14.6	69.1
Canada	12.9	85.6
Sweden	10.0	69.4
Spain	7.8	50.5
South Korea	6.7	40.1

CANADA

Ontario Hydro To Study Possible New Nuclear Station

51200026 Toronto *THE GLOBE AND MAIL*
in English 14 Jun 90 p A6

[Text] Toronto—Ontario Hydro has approved the initial spending toward a possible new nuclear generating station that it estimates would cost between \$20-billion and \$23-billion. Hydro's board of directors has approved spending up to \$67.1-million over the next two years on engineering studies of alternative sites at Darlington, Wesleyville and the North Channel area of Lake Huron.

Darlington Workers Exposed to Radioactive Spill

90WP0126A Toronto *THE TORONTO STAR*
in English 27 Jun 90 p A17

[Text] Seventeen Ontario Hydro workers have higher levels of radiation in their bodies after an accident at the Darlington nuclear plant.

But the levels of exposure from the spill of radioactive water are well within allowable limits, said Grant Childerhose, production manager at the \$12.6 billion plant near Oshawa.

Urine samples of the 17 workers showed levels of tritium—a radioactive form of hydrogen—between three and 33 millirem, Childerhose said yesterday.

A millirem is the unit for measuring the harm caused by radiation on human tissue. The Atomic Energy Control Board allows an annual dosage of 5,000 millirem. The Hydro limit is 2,000 millirem.

About 15 other workers showed no increase in tritium levels, Childerhose said.

The workers were exposed when about 240 litres (63 gallons) of radioactive heavy water was spilled in Darlington's tritium removal facility last Friday evening, Childerhose said.

The water, which had been trucked from the Pickering nuclear plant, was being transferred into a storage container through a 4.6-metre (15-foot) metal pipe when it leaked out of a connector and on to the floor.

Crews wearing protective suits recovered about 200 litres (52 gallons) of the water and the facility is back to normal, Childerhose said.

Epp Orders Inspection of Romanian Candu Complex

51200025A Toronto *THE GLOBE AND MAIL*
in English 7 Jun 90 p A13

[Article by Charlotte Montgomery]

[Text] An unfinished Candu nuclear reactor complex in Romania is to be examined for technical flaws as Canada

decides whether to provide a multimillion-dollar loan to finish the job. Energy Minister Jake Epp agreed to order the inspection of the controversial Candu project at a meeting with two opposition party MP's who demanded an inquiry into the quality and conditions of work at the Romanian site, a spokesman for Mr. Epp said.

Eric Alexander, the minister's spokesman, said he did not know whether a decision on a loan to finish the project would be made only after the inspection. But "one can fairly assume the government would have every interest in having the results" beforehand, Mr. Alexander said.

In May, New Democratic Party MP [Member of Parliament] Svend Robinson and Liberal MP David Walker visited the unfinished Candu project in Cernavoda, west of the Romanian capital of Bucharest, in the wake of news reports of appalling housing conditions, forced labor and poor workmanship.

Canada has been helping Romania to build the project for a decade and most criticisms spring from the regime of dictator Nicolae Ceausescu, who was deposed and killed last December.

The two MP's were invited to meet Mr. Epp and External Affairs Minister Joe Clark on 31 May to share their observations and recommendations, Mr. Alexander said. A spokesman for Mr. Clark said that the meeting was private and that recommendations from the MP's were being given serious consideration.

Mr. Epp's spokesman said no decision had been made about how the review will be conducted. Mr. Robinson said he and Mr. Walker were assured that the Romanian government's request for additional money to finish the project would be given special scrutiny and the results of the inspection will be taken into account. Mr. Walker said Mr. Epp also indicated that a House of Commons committee will examine this fall how Crown corporations such as Atomic Energy of Canada Ltd. should deal with the sort of circumstances presented in Romania.

Donald Lawson, president of Candu operations for AECL [expansion not given], has said the quality of work on the project deteriorated so badly under a speedup ordered by Mr. Ceausescu last year that one-third of all welding work was unacceptable. But he said the welding work is back to proper standards now and the project's construction is sound.

Pickering Nuclear Reactor Restarted After Shutdown

51200024A Toronto *THE GLOBE AND MAIL*
in English 7 Jun 90 p A11

[Text] The first of eight reactors at Ontario Hydro's Pickering nuclear power station was restarted this week after a month-long maintenance shutdown of the entire

plant. Three more reactors are to be restarted in the next two days and all but two units are scheduled to be operating by mid-June.

Michele McMaster, a Hydro spokeswoman, said the shutdown was required for inspection and maintenance that is carried out every 10 years on the vacuum building, which is designed to contain any radioactive steam if a malfunction occurs. She said the shutdown is scheduled for spring because that is when the demand for electricity is at its lowest, coming between the highest demand period, winter, and second-highest, summer.

The seventh Pickering unit is to be restarted on 1 September after an inspection of the pressure tubes. The eighth unit, being retubed, will be shut down until April.

A combination of factors forced Hydro to buy more power this winter from other utilities. A loss of efficiency and the need for retubing at the Bruce A Station and a delay in the startup of the new Darlington nuclear station coincided with a 35 percent decrease in allowable acid gas emissions.

FRANCE

Generator Replacement Program Nears Completion

90WP0097A Paris L'USINE NOUVELLE/ TECHNOLOGIES in French May 90 pp 15-16

[Article by Marc Chabreuil: "Steam Generators: Dampierre-1 Change-Out"—first paragraph is L'USINE NOUVELLE/TECHNOLOGIES introduction]

[Text] A French technological first for EdF [Electricity of France] and Framatome: Replacement of three 300-metric-ton steam generators.

At the beginning of next month, operation RGV (Steam Generator Replacement) will be completed. Placed in service just 10 years ago, block number 1 of the Dampierre-en-Burly (900 MW) power plant will then have three brand new steam generators. This is a major French first for EdF and Framatome. Suffering from corrosion under stress and from mechanical wear, this equipment constitutes the weak link in the power plants. Sooner or later, they will all have to be replaced (EdF is planning identical operations at Bugey, Fessenheim, Gravelines... in the next two to three years). Furthermore, the replacement market is significant. For Western Europe alone, it is estimated at 30 new generators between now and the year 2005—a gold mine that Framatome is not willing to abandon to the American companies Westinghouse, Power Cutting Industry, and Bechtel or to the German KWU.

Operation RGV, which will take 13 weeks, has been the object of meticulous preparations: 100,000 hours were devoted to planning, optimization of the reduction of the exposure of personnel to radiation, quality assurance, and implementation costs—not to mention the design

and production of 100 metric tons of special tools and automated equipment for working in the radioactive environment.

Dampierre was chosen to test and demonstrate French mastery of the field because block number 1 was to be shut down for a 10-year inspection. And, because "its steam generators presented specific unexplained defects: networks of microcracks not accessible to conventional methods of nondestructive testing," adds Pierre Claisse, of EdF's Nuclear Production Center. Replacement of a steam generator is more than just a "simple" maintenance operation on a 300-metric-ton piece of equipment in a radioactive environment. The primary circuit is first decontaminated by chemical and electrochemical procedures. Then the four piping systems (two for the primary circuit, two for the secondary circuit) are cut off from the plasma by remote control due to the presence of residual radiation. Once the used generator has been removed in one piece, it is necessary to connect the new equipment to the old stainless steel pipes. Following topological measurements with a computerized theodolite, a "mockup" of the new steam generator is inserted. A final adjustment enables programming the numerical control machines which will cut the bevels on the primary lines. Once the new generator is in place (positioning of the pipe ends with 1-mm accuracy), a triple weld (coated electrode TIG [tungsten-inert gas welding] followed by orbital TIG) is carried out. This is a complex operation—it is necessary to unite new and worn materials—guided and controlled remotely: Video cameras and microphones permit direct monitoring of the welding which will subsequently be inspected radiographically. "To accomplish this, we created a welding school at Chalon-sur-Saone where 40 individuals have been trained in this operation for from 1 to 4 months," reports Framatome's Gerard Doremini.

To these purely mechanical difficulties were added the constraints of working in a radioactive environment. "Framatome and EdF developed simulation software, Dosi Ana, enabling daily evaluation of the dosimetry for each operation at each location. The conclusion reached was that the collective dose would not exceed 450 rems," according to Yannick Le Corre, Framatome director of nuclear services. (On 5 April, it was only 100 rems, for an anticipated maximum of 250.)

Called an industrial operation by those in charge of it, "operation RGV, which is expected to require 350,000 work hours on site (two-thirds of it performed by Framatome) and involve more than 500 persons, will cost more than Fr600 million," according to EdF's Marcel Choraine. This is an investment because it has a promising future. The tubes of the new steam generators, made of Inconel 690 with a high chromium content, are less susceptible to corrosion. Furthermore, expert metallurgical analysis of one of the disassembled systems will provide a better understanding of this phenomenon and, ultimately, enable mastery of it—with the goal of a service life of 20 years, instead of the current 15 years. Half that of a nuclear power plant block!

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